JULY 31, 1937

ELECTRICAL WORLD

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BUILDING LOAD WITH LIGHT

Featured in the Annual Lighting Insert in This Issue

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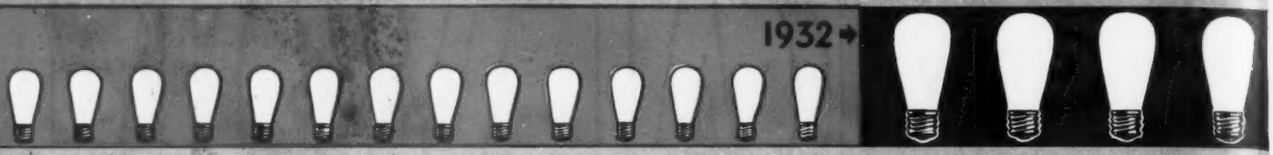
1932 →



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Reprinted from Electrical World, September 29, 1934, *"New Tools for Selling Light"*

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ELECTRICAL WORLD

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Coming Features

Motor Equipment for Conveying Machinery

The technology involved in the proper selection of motor drives for industrial conveyor systems of various types is soon to be discussed by George Hall, consulting engineer.

Step Regulators Avert Large Rural Outlay

At one-third the cost of alternatives, Central Hudson Gas & Electric Corporation installed step regulators in rural areas to improve voltage conditions. Engineers Landis and McLaughlin will tell the story in a coming article.

Waterside Adopts the Shielded Bus Scheme

Reasons leading to the selection of a revolutionary shielded bus arrangement for Consolidated Edison Company of New York's Waterside station will be given in a coming issue. Preliminary details of the scheme are stated briefly with the frontispiece of this issue.

On the Cover

The myriad lights of a great city symbolize the part that lighting plays in the domestic, commercial and industrial life of the nation. This unusual night photograph is a Wide World picture.

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ELECTRICAL WORLD

JULY 31, 1937

Does Bill Johnson Know?

"If you want the real low-down, why don't you ask Bill Johnson? He ought to know. He works for the light company." And that is the point of view of a large percentage, if not the majority, of the public on matters pertaining to rates, power company activities or policies. The Bill Johnsons are the company contacts with the public—they are the company to their friends, neighbors and acquaintances. But, does Bill Johnson know?

Does he know what the rates are and can he explain the reasons for the differences in the schedules? If the rates are higher than those in some other community, can he tell why? Does he know how often the rates have been reduced and how much? Does he know the extent to which the company is regulated and the records it has to keep?

When a customer calls the company a robber, can Bill Johnson tell that customer how much the company takes in, how much it spends, and what it spends the money for? Can he tell that customer how much the employee takes in wages, government in taxes, bondholders in interest and stockholders in dividends? Does he know the different taxing bodies whose hands are in the utility's till and what the tribute to each is?

What does Bill know about the physical system of the company? Can he explain what is being done to provide continuity of service? Does he know the meaning of interconnection or reserve capacity or the relative economies of steam and hydro?

Or, again, it may be that the company is making a drive for some particular business, and the customer asks Bill what he knows about it. It may be an appliance, or it may be lighting for stores, or air conditioning—in fact, it may be anything. A customer may want something fixed, can Bill tell him how to go about it?

Now Bill Johnson may or may not know and, if he doesn't know, he may not be willing to admit that he hasn't the answer. What kind of a reply is he going to give to those who ask him questions? What kind of information or misinformation is he going to start going the rounds?

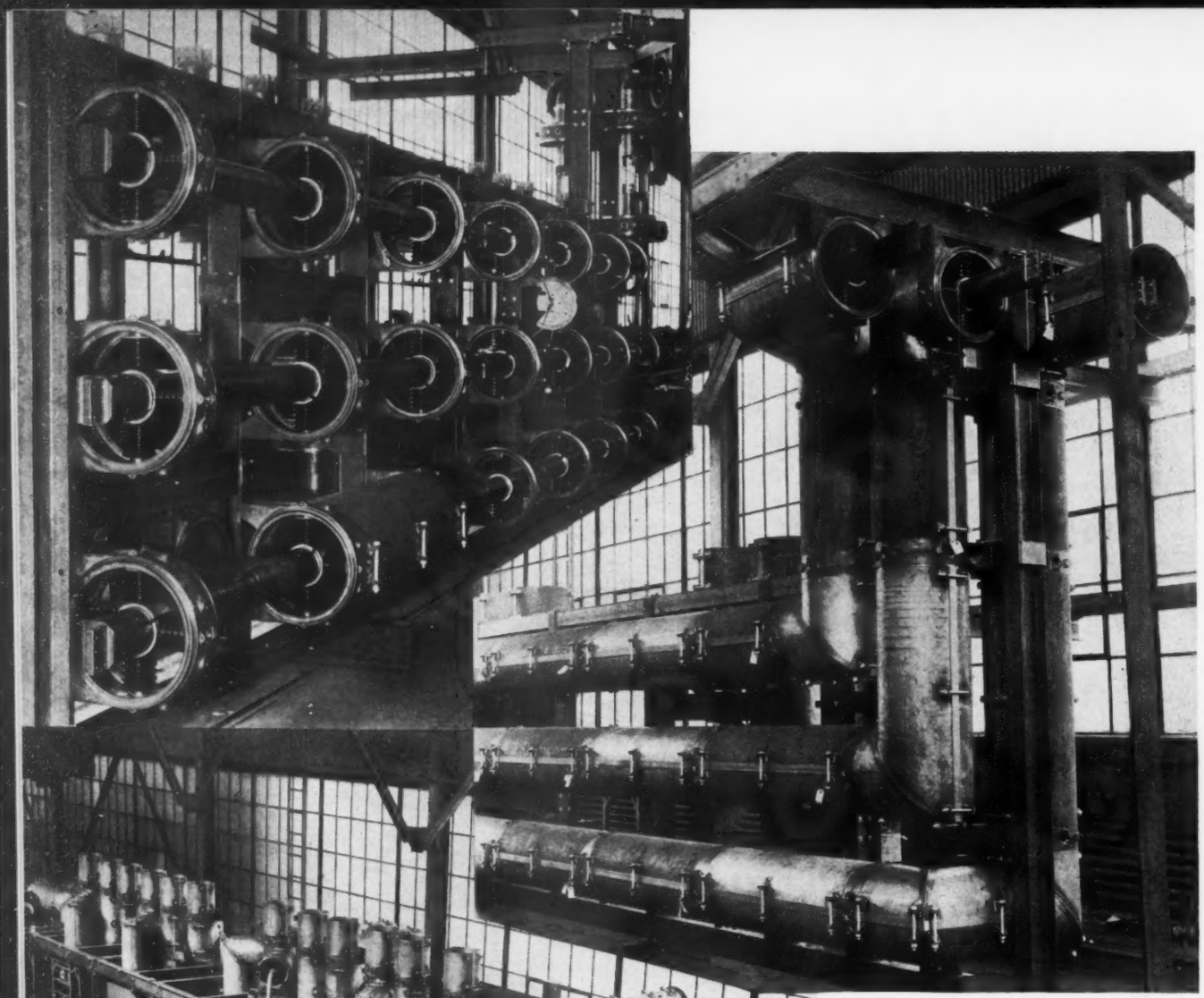
Electric utilities can expect a certain amount of public misunderstanding as the result of disgruntled customers, scheming politicians and just plain gossip. It should not be increased by uninformed utility employees. While there will always be employees who are unfriendly to their company, the rank and file will be found to be interested in their company's welfare. These loyal people can do an immense amount of good by correcting wrong impressions and helping the public to understand better its local electric utility.

Building a better public understanding through employee contacts has the added advantage of bringing the employees closer to the company. When they are told nothing, their interest in the company problems lag. But if the men and women know things they feel that perhaps they can help the company, and they can.

Of course, great care must be exercised in taking this information to the employees. They must not be made the carriers of propaganda. Facts only are wanted, and those facts, at least in the beginning, should be confined to the company's own operations. Such figures are always much closer to the individual—they are much more meaningful.

There are many ways of getting this information to the employee. No matter what method is employed, however, much will be gained if the men and women are encouraged by their department heads to ask questions. When an employee wants to know things, he is not just inquisitive, he is interested.

When Bill Johnson really knows, the public will understand and be friendly.



Stringent space limitations imposed upon engineers of the Consolidated Edison Company of New York in revamping and modernizing Waterside station have brought about the development of a strikingly compact metal-inclosed bus structure with energized buses supported by insulators within a solidly grounded metal inclosure, permitting the spacing between phases to be reduced to a minimum. The accompanying factory illustrations show a section of the bus structure assembled at the Greensburg plant of Railway & Industrial Engineering Company, builder of the equipment. "Electrical World" will present the design and installation details by Consolidated Edison engineers in a forthcoming issue.

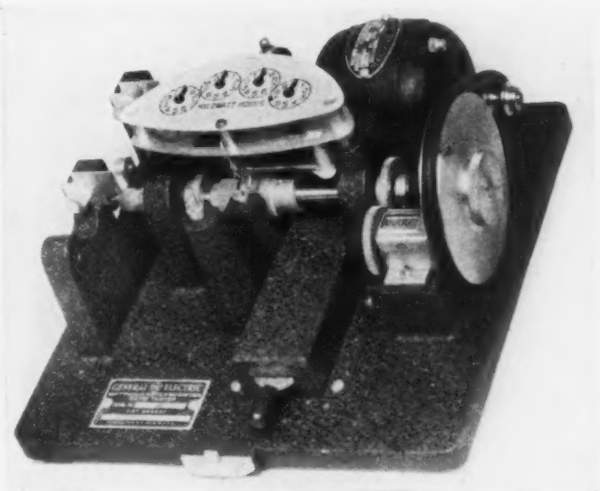
WATERSIDE PIONEERS METAL-INCLOSED BUS

Facilities for Maintaining Meter Registers

No Department Too Small to Need the Proper Means for Cleaning and Repairing Registers and Checking Their Ratios

By E. G. McKINNEY
Meter Department, Oklahoma Gas & Electric Company

CLEANING, replacing damaged parts, changing ratios for changed conditions of meter operation and checking ratios to assure their correctness are the four principal operations in the maintenance of watt-hour meter registers. In a large meter department there is a sufficient amount of this work to take the time of one or more men who, with study and experience, become expert. And register repair and checking should be done only by competent men, because an incorrect register ratio in service may go undetected for a considerable time, causing either a loss of revenue or an embarrassing overcharge. Even in the small meter department the best practice is to require all register maintenance, except changing dial faces, to be done in one place by one man and to provide him with a mechanical ratio checker.



Device checks register ratio of late meters

It will check General Electric I-14 and all later type registers of that make. Westinghouse OA, OB and OC, Sangamo H, HC and HF and Duncan M, MD and MF

Registers are sometimes corroded by fumes, smoked by fire or made gummy by the condensation of insulating paint and varnish baked out of the coils. Carbon tetrachloride is often used to clean such registers, but the jeweler's cleaning solution given below has been found to be more effective.

Materials:

Oleid acid	3 oz.
Borax, saturated solution	4 oz.
Ammonia, 28 per cent	24 oz.
Alcohol, denatured	24 oz.
Distilled water to make 1 gal. of cleaner	

Directions:—Mix acid and borax solution together with a small amount of water. Then add, one at a time, ammonia, alcohol, distilled water. Mixing in any other order will result in insoluble compounds.

After parts have been cleaned in this solution rinse thoroughly in benzol and dry. The benzol neutralizes the cleaning solution and prevents corrosion.

This solution will clean the metal parts of a register without damaging the new type faces if the face is not in the solution more than ten or fifteen seconds. Older type faces may be left in the solution for still longer periods of time without being damaged.

Meter parts other than registers may be cleaned in this solution, so it is very useful in the meter laboratory. It may be stored in a glass bottle. The best way to use it is to have two glass dishes with ground glass covers, one for the cleaning solution and one for the benzol.

Sometimes shaft spindles become corroded and cause too much friction. These spindles may be cleaned by pushing them into a Ruby eraser and twisting until polished. Care must be exercised not to bend the spindles so they will be out of line.

Most spare parts used in register repairs are acquired by salvage from badly damaged registers. Dial faces and pointers, ratio gears and first pointer shafts are the only parts that are purchased new.

Meters that are to be installed in locations where strong sunlight can reach the register should have dial faces of the new sun-resistant type. This type of face is available from all manufacturers for all types of meters. If very many meters are involved it may seem like an expensive item to replace so many dial faces. However, a new dial face installed in the shop before the meter is set will save changing the meter a little later on when the old dial face goes bad.

Changing ratios

Sometimes there accumulates in the meter laboratory a surplus of some register ratios because meter sizes are changed or for other reasons. It is possible to change the ratio in a certain type of register by replacing the

ratio gear and first point shaft, or by changing the worm wheel shaft. This type register is the General Electric, Type I-14 and later types, having two small pillars on the back plate. These small round pillars support a rectangular plate which has the bearing for the ratio gear.

Ratio changing

Three gears are involved in changing ratios, the "worm wheel," the "ratio gear" and the "first pointer shaft."

The gear wheel that meshes with the worm gear on the disk shaft is the "worm wheel." Its shaft is the worm wheel shaft.

The gear that meshes with the worm on the worm wheel shaft is the "ratio gear." Ratio gear also includes the shaft and the gear which meshes with the "first pointer shaft."

The "first pointer shaft" is the shaft that carries the first dial pointer.

The worm wheel shaft may have either a double or a single worm gear meshing with the ratio gear. With all other gears remaining the same, changing from a single to a double worm wheel shaft will cut the register ratio in half. The double worm wheel shaft may be identified by two circles around the shaft or by inspection of the worm gear itself.

While it is possible to double any register ratio by changing from double worm to single worm wheel shaft or to halve a register ratio by changing from a single to a double worm shaft, these methods are recommended only when they agree with the manufacturer's practice. For example, a 333 1/3 ratio may be changed to 166 2/3 by substituting a double worm for the single worm shaft. However, this does not follow the standard practice of the manufacturer because the 166 2/3 register normally has a single worm wheel shaft. A double worm wheel shaft would cause confusion.

On the other hand, a 33 1/3 ratio may be changed to 16 2/3 by substituting a double worm wheel shaft for a single worm. This conforms to the manufacturer's standard practice so no confusion will arise if that is done.

The other method of changing ratio is to change the ratio gear and the first pointer shaft. The necessary parts are ordered from the manufacturer, specifying ratio gear for the desired ratio and the first pointer shaft for the desired ratio, for I-20 registers. It will be necessary to use the late type one-piece dial pointer on the first pointer shaft, so these should be ordered if they are not already in stock.

When the parts are received from the manufacturer the boxes should be clearly marked to show the ratio for which the gears are intended. This will save considerable time and reduce the chances for error.

When installing the new gears make a careful check to see that they mesh properly with no binding or slipping. In some cases the bearing supports get bent out of place and must be straightened.

When the ratio of a register is changed the ratio stamping on the back plate and the ratio plate must be changed. The old stamping may be ground off on a small grinder and the new ratio stamped on with metal stamps.

The ratio plates are likely to be bent in this process, but they may be straightened by placing between two pieces of hard cardboard on a flat surface and hammering them lightly.

If it is possible to salvage a few back plates and ratio plates from registers other than those being converted they may be stamped for the new ratio and used in the converting process. This will make it possible to take apart and reassemble the registers being converted without stopping to grind off the old ratio and stamp the new.

Checking ratios

After any register ratio has been changed or any parts of a register replaced the ratio of the register must be checked. It is possible to check register ratios by hand, although it is tedious and there is considerable chance for error. The number of revolutions of the worm wheel shaft that are required to cause one revolution of the first pointer shaft is the register ratio. The worm wheel may be rotated by hand and the revolutions counted to check this.

It is much better to have some type of mechanical checking device which will drive the first register gear at a fairly high speed and count the number of revolutions. A good many meter departments have built such devices. Usually these devices will check one or two types of registers.

So far as the author knows, only one manufacturer is prepared to furnish a checking device which will check most makes and types of register. This check is shown in the accompanying illustration.

Estimates Vary of World's Water Power

In the course of a paper recently read before the Institution of Mechanical Engineers P. W. Seewer, M.I. Mech. E., the chief engineer of the hydraulic department of the English Electric Company, Ltd., estimates that the world's available water power amounts to about 500,000,000 hp., this being divided over the different parts of the globe as shown in the appended table. Mr. Seewer adds that the figures can be taken as the power available at ordinary minimum flow; the considerable margin due to storage which is possible in a large percentage of catchment areas is omitted so that the figures are conservative.

In the issue of July 3, 1937, on page 49, ELECTRICAL WORLD published a table giving the estimated water power, by continents, as announced by the U. S. Geological Survey. Comparison of the two lists shows how widely estimates by competent authorities vary. Both agree, however, in the major conclusions to which they point: Total developments are about 60,000,000 hp.; only one-tenth to one-eighth of the world's available hydraulic power has been harnessed.

	Probable Energy Disposable, Hp.	Utilized Energy, Hp.	Utilized Energy, per Cent
Europe	58,000,000	19,500,000	33.7
America (all)	127,000,000	33,000,000	26.0
North and Central America	73,000,000	30,000,000	42.0
Asia	90,000,000	5,400,000	6.0
Australia	17,000,000	850,000	5.0
Africa	190,000,000	380,000	0.2

Lightning Safeguards Proven by Model

By S. K. WALDORF
Pennsylvania Water & Power Company, Baltimore, Md.

EFFICACY of modern lightning protection of transmission lines by means of overhead ground wires and buried counterpoises is demonstrated by a model constructed by the Pennsylvania Water & Power Company. It shows clearly that the solution of the protection problem may be resolved into two parts:

First, line conductors carrying load must be shielded by overhead ground wires from lightning striking them.

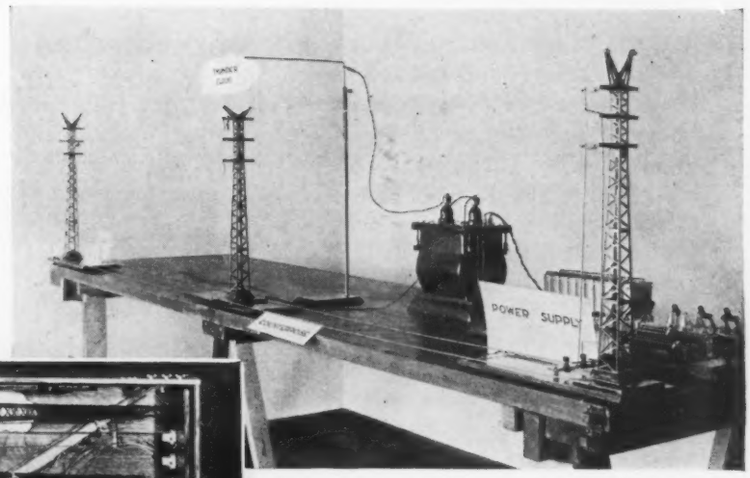
Second, a grounding system must be provided to carry away the current produced by a lightning stroke. This must be co-ordinated with line insulation in order that the voltage across the insulators can be prevented from rising to a dangerous value.

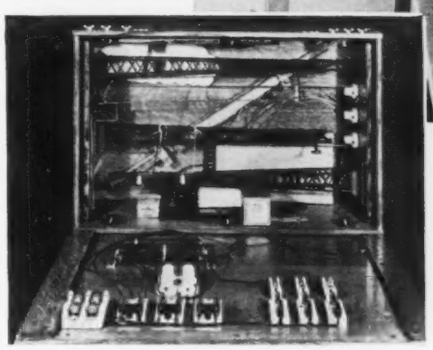
As one of the purposes of the model is to compare operation of a line with and without overhead ground wires, one span is provided with such wires and the other is not. Supports for the overhead ground wires on the one span were added on two of the towers. As the end tower represents a strain tower, the ground wire supports on it must be slightly higher than those on the middle one, which represents a suspension tower. The supports on the two towers are so proportioned that the clearance between the overhead ground wires and the line conductors is the same at both towers. The span lengths are about 5 ft.

The thundercloud from which a miniature lightning flash originates is supported so that it can be swung readily from the span having overhead ground wires to the other span. When the cloud is over the latter span the flash distance is too great. To overcome this a small wire is hung from the cloud to reduce the flash distance to the proper value of about 1¼ in.

The surge is obtained by discharging a capacitance of about 120 mfd. through the primary of the testing transformer. The power supply was chosen as 250 volts d.c. for charging this capacitance and also for easy maintenance of the flashover arc on the model line. The series lamps shown in the capacitor circuit serve to limit the charging current of the capacitor when the left-hand switch of this circuit is closed. They also serve to limit the direct current through the transformer primary after the surge has occurred upon closing the right-hand switch of the capacitor circuit. The shunt lamps discharge the capacitor when the left-hand switch, just referred to, is opened. This combination is a safety feature to insure the initiation of a surge only when wanted.

If a flash occurs to a line conductor or to the overhead ground wires when the counterpoise conductors are not in place flashover will occur at the carbons provided on the middle tower. The resistors, load and arcing gap of the carbons have been so proportioned that one ampere maintains a stable arc after being initiated by the lightning surge.





Model packs into carrying case
This case, 30x7x19 in., holds all but the capacitor and testing transformer

Protection principles confirmed

The principles of modern lightning protection are demonstrated by the following experiments:

1. With the power off and the thundercloud over the span without overhead ground wires, it can be demonstrated that lightning striking on an insulated conductor always causes flashover, even though no power is being transmitted over the circuit. There is no power arc under such circumstances and there is no damage done to the metal structure. Lightning strokes alone do not damage metal structures, only wooden supports.

2. It is the power follow-up which breaks insulators and burns conductors. This is demonstrated with the line energized and the lamps representing the load lighted. The flashover is repeated, a power arc is initiated and maintained with the brilliancy of the load lamps much reduced due to low voltage. The carbons are provided to take the arc, as the metal of the line would be melted almost immediately if the carbons were not used. This demonstrates the need for the rapid interruption of a power arc when formed.

3. Satisfactory operation is not re-established until the arc is extinguished by opening the power switch, by blowing out the arc with the breath or by suppressing the arc with the connection of one of the ¼-amp. fuses in the circuit. The service interruption is minimized if the circuit is

[*Continued on page 122*]

That Georgia Power Home-Town Electrical Contest

How It Started, What It Aimed For, What Was Accomplished and What Were the Lessons Told in Full for the First Time

SEVEN months have passed since Georgia Power Company concluded its unique and much-discussed "Home-Town Electrical Contest," known also as the "Champion Home-Town Contest."

Load building and good-will building were the two major objectives of the contest. As to the first, here is the record: Average annual use per residential customer increased 150 kw.-hr., —from 1,010 kw.-hr. to 1,160 kw.-hr. And to answer, at the outset, a second question raised by the industry, residential usage for the months ended May, 1937, averaged 1,243 kw.-hr.

So much for the *load-building* record, and the second part of the job—*good-will building*—will be discussed later in this article, which relates for the first time the complete story of a contest not clearly or completely understood by the industry.

Dramatists of electric service

C. A. Collier, vice-president, and John R. Marsh, manager, advertising department, of the Georgia Power Company directed the efforts of 4,400 company employees in building added load and added good-will for the company on a state-wide scale and in a way that dramatized electric service to the man in the street.

The contest summarized

Briefly, the contest was a promotion in which 270 towns out of 491 served at retail by the Georgia Power Company, and grouped into four classifications according to numbers of residential customers, competed for $10,600 in 26 cash prizes. The 270 towns participating in the contest were all of the towns served by the company that are both incorporated and have 25 or more residential electric consumers, the nature of the contest making it necessary to eliminate those communities not meeting these qualifications. Three prizes ranging from $500 to $1,000 were offered to the larger towns in each of population groups "A" and "B" and six prizes ranging from $100 to $750 were offered to the smaller towns in each of population groups "C" and "D."

The contest rules provided that the prizes were to be administered through local governmental bodies and were to be used only for civic, charitable or educational purposes. In the "group" competition prize rankings of towns were based on "contest points" attained during the twelve months of the contest; that is, ten points for each kilowatt-hour of increase in the town's average, plus one point for each kilowatt-hour of actual average. The "sweepstakes" competition was based only on the highest kilowatt-hour averages attained, regardless of "contest points" scored in the group competition. There were two prizes—$750 and $250—to "sweepstakes" winners. The "improvement" prizes were offered during the last six months of the contest—a prize of $100 to the town which led in each of the company's six territorial divisions in kilowatt-hour average increase for the period.

It was found that the idea out of which the Home-Town Contest grew may have been germinated as far back as six or seven years ago, when interest and competition were developed among the company's six territorial division managers and 26 district managers based upon the kilowatt-hour average as an index of load-building accomplishment. In 1934 statewide publicity was given to the kilowatt-hour averages of about 40 of the highest ranking communities. There was an immediate upward surge in public interest. Towns began boasting of their high averages and other towns not included on the list wanted to know where they stood.

Then, the question was asked: "Wonder if it wouldn't be possible to design a Home-Town Contest on the basis of these figures? Wonder if it wouldn't be possible to build up a friendly competitive spirit among the towns we

serve, on the basis of their kilowatt-hour averages?" While listening to opinions pro and con for a solid year prior to actual announcement of the Home-Town Electrical Contest, the plan for it was written and rewritten, and finally the contest was ready for announcement.

Ground is well cultivated

During the preliminary period of two or three years, when popular interest was growing, the company had seen to it that its customers and employees were kept informed regarding Georgia's *electrical progress*. It seemed natural, therefore, that the Home-Town Contest should be announced as a search for "Georgia's Champion Home Towns." The following paragraphs are excerpts from a contest booklet distributed to selected customers, entitled "$10,000 to Find Out Which Are Georgia's Champion Home Towns":

What is a champion home town?

It's the town that's richest in peace and contentment, opportunity for pleasant hours with friends and family, useful leisure, prolonged youth—all those things which go to make up real, wholesome joy in life, while life's duties are being performed and its obligations are being met. It's in the *home* that these blessings have their origin and their being.

What single factor, today, has most to do with giving men, women and children—and women, most especially!—these rightful heritages of every mortal soul? What has done most to bring new ease, new leisure, new comfort, new economy, new brightness to Georgia homes?

The answer is simple and self-evident: *Electric Service.*

It appears that the timing of the contest was exactly right—residential rates were low and promotional in type, customers and employees had already been impressed with the progress of the territory in the use of electricity, the company's relations with the public were friendly, business conditions had improved to the extent that communities were taking renewed interest in civic improvements and enterprises, employee morale was excellent—everything seemed in order for the acceptance and promotion of an idea as novel as the Home-Town Contest.

Two men in the Atlanta headquarters of the company were given major responsibility for promotion of the contest, both among employees and customers. One was a member of the sales department and the other a member of the advertising department. Each had been employed for more than ten years and was well known throughout the company. Because of the large area served by the company —approximately 44,000 square miles —the division, district and local managers were given the responsibility for promoting the contest within their respective territories. Then, to coordinate the work and to link up the field activities with the central office in Atlanta, a contest sponsor was appointed in each of the six territorial divisions, these employees giving their full time to the work when the contest was first launched and a substantial part of their time throughout the remainder of the year.

Presentation to all employees

Of course, it was necessary to familiarize all employees with the plan and purpose of the contest. The first presentation to employees was at a series of divisional meetings beginning in September, 1935. Division, district and local managers, salespeople, home service workers and others were in attendance. The presentation was made by one of the contest general sponsors, whose talk was based on a series of colorful 4x6-ft. charts.

Meetings of employees were held by division, district and local managers following the larger divisional meetings. Almost all employees arranged to attend these meetings to hear the complete contest story—salesmen, linemen, servicemen, auditors, home economists, substation operators and janitors. They were told of the many ways in which they could assist in promoting the contest—in their contacts with customers, by selling small appliances and by turning in prospects for major appliances and home-lighting demonstrations—and all employees were kept informed of progress of the contest among towns, as well as of their own contests, through two regular employee publications and special contest bulletins.

Presentation to customers

Having informed and "sold" the executive personnel and employees on the plan and purposes of the contest, the next step was to carry the story to the company's 150,000 customers scattered over three-fourths of the state's area. Interest of leading citizens in each of the 270 towns eligible for the competition was necessary to the contest's success. Several weeks prior to announcement of the contest district and local managers were asked to prepare mailing lists of city officials, officers of civic and women's organizations, electrical dealers and contractors and other persons in their territories who might be interested in the competition. A copy of the Customers' Presentation Booklet —a small booklet containing complete details of the contest—together with a letter from P. S. Arkwright, president of the company, was mailed to the 5,000 persons on the combined mailing list.

In order for employees to tell the contest story at group meetings of customers completely and effectively a presentation easel was planned and produced. The physical form of the presentation was that of an 18x24-in., self-forming easel, made of heavy cardboard covered with blue paper. The front folded back and snapped to form an easel. The inside of the easel contained twenty pages printed in red and blue on white, each page being illustrated with photographs or drawings, designed to tell, progressively

WHAT DID THE CONTEST COST?

The only extra appropriation reported by the company in connection with this contest was the $10,600 in cash prizes awarded to the 24 leading towns. No extra advertising expenses were incurred, as regular budget appropriations were drawn upon for all contest publicity. For example, a large part of the regular institutional advertising budget was devoted to promotion of the Home-Town Contest.

Another way to look at the cost angle of the Home-Town Contest is to recall that it was only a vehicle which the company used for a year. In it were centered the sales and promotional efforts and around it were woven most of the company's activities in load building, advertising, customer contact work, home service, appliance repair and good-will building.

and interestingly, the plan and the purpose of the Home-Town Contest. Printed on the back of each preceding page was complete information for the employee to use in speaking about the page which happened to be facing the audience. This "copy" enabled employees unaccustomed to speaking to *read* the remarks for each page; for employees more accustomed to speaking the "copy" served as a guide and pattern by which to make their talks.

Advertising and publicity

The Home-Town Contest lent itself to the use of almost every practical advertising medium. The company's merchandise advertising offered a natural tie-in, and the bulk of the institutional advertising was used to promote the contest. No extra advertising appropriations for contest promotion were made, all expenditures being made out of regular advertising budgets.

There are fifteen daily and 150 weekly newspapers in the retail operating territory of the Georgia Power Company. A news story announcing the contest plan was sent to each the week prior to release of the announcement advertisement. Other stories were released on the monthly standings of towns in the contest and on the 24 final winners in the competition. Still other stories and picture layouts were prepared at the request of various papers in the state. Newspaper advertisements designed to give news of the progress of the contest and to interpret it from the standpoint of both individual communities and homes were published once a month.

Considerable use of direct mail advertising was made in the contest promotion. Mailings included letters, broadsides, bill inclosures and publications. Approximately 30,000 copies of the "Customers' Presentation Booklet" were printed and distributed to city officials, civic leaders, members of sponsoring organizations and company employees. This booklet also was used as a counterpiece in company stores. Several bill inclosures were mailed to the company's 150,000 electric customers during the contest.

Constant use was made of three of the company's regular publications—*Round the Home*, 30,000 copies per month to customers on rural lines and in small towns; *Bright Spots*, 33,000 copies per month to commercial customers; *Two Bells*, 50,000 copies per week distributed through racks in Atlanta street cars. A special publication, *The Home Town Champion*, was designed specifically to carry news and information about the progress of the contest. Approximately 5,000 copies were mailed monthly during the year to city officials, civic leaders, members of sponsoring organizations, newspaper editors, electrical dealers and others.

Principal use of the outdoor advertising medium was the designing and erection of five 30x12-ft. painted bulletins. Four of these boards designated leadership in the "group" competition phase of the contest and were erected each month in the towns leading their respective groups in "contest points." The other bulletin designated leadership in the "sweepstakes" competition and was erected each month in the town which ranked first in the state in annual kilowatt-hour use per residential customer. The signs read, for example: "Woodbine Now Leads in the $10,000 Home-Town Electrical Contest. Let's Hold Our Lead And Win First Place!" The signs were repainted with an appropriate message in the four first-place winning towns at the end of the contest and left up for approximately two months. The company operates 83 retail stores, each of which with its windows served as a place to display information and attendant publicity all during the contest period.

Dealers, distributors and manufacturers

Because the 25 or so distributors and manufacturers' branches have a definite interest in increased sales of appliances and equipment and have representatives traveling the territory contacting both company employees and dealers, their interest in and enthusiasm for the contest was greatly desired. The company's staff of dealer representatives was instrumental in promoting the contest among 200 dealers, showing them how they might

[*Continued on page 118*]

Prize-Winning Towns—Before, During and After the Contest

Town	Amount of Prize	Kw.-Hr. Average, 11–1–35	Kw.-Hr. Average, 10–31–36	Kw.-Hr. Increase During Contest	Kw.-Hr. Average, 6–1–37
Group Prizes (1)					
Group "A"—(Towns having more than 400 residential customers)					
Americus	$1,000	1,404	1,876	472	2,164
Tifton	750	1,576	2,013	437	2,205
Statesboro	500	1,307	1,710	403	1,836
Group "B"— (Towns having from 200 to 400 residential customers)					
Baxley	$1,000	1,488	1,952	464	2,253
Manchester	750	1,708	2,030	322	2,149
Swainsboro	500	1,270	1,602	332	1,613
Group "C"— (Towns having from 100 to 200 residential customers)					
Reidsville	$750	1,007	1,623	616	1,296 (4)
Shellman	500	1,281	1,860	379	2,108
Warm Springs	400	1,770	2,290	520	2,439
Vienna	300	1,357	1,816	459	1,764 (4)
Wadley	200	941	1,432	491	1,579
Louisville	100	1,916	2,295	379	2,072 (4)
Group "D"— (Towns having from 25 to 100 residential customers)					
Woodbine	$750	1,897	2,941	1,044	3,419
Chipley	500	1,162	1,736	574	1,839
Ailey	400	1,436	1,924	588	1,404 (4)
Darien	300	1,505	1,940	435	1,834
Baconton	200	1,547	1,944	397	2,154
McIntyre	100	873	1,319	446	1,147
Sweepstakes Prizes (2)					
Woodbine	$750	1,897	2,941	1,044	3,419
Louisville	250	1,916	2,295	379	2,072 (4)

Improvement Prizes (3)

Town	Amount of Prize	Kw.-Hr. Average 5–1–36	Kw.-Hr. Average 10–31–36	Kw.-Hr. Increase Last 6 Months	Kw.-Hr. Average 6–1–37
Forest Park	$100	951	1,147	196	1,250
Powder Springs	100	1,021	1,231	210	1,191 (4)
Rutledge	100	1,053	1,268	215	1,056 (4)
Eatonton	100	1,482	1,746	264	1,988
Bartow	100	991	1,158	167	1,372
Greenville	100	1,303	1,531	228	1,778

(1) Prize rankings based on "contest points"—ten points for each kw.-hr. of increase in the average plus one point for each kw.-hr. of actual average attained.

(2) Prize rankings based on highest kw.-hr. averages attained by end of contest.

(3) Prize rankings based on largest increase in kw.-hr. average during last six months of contest—leading town in each of six company divisions. Towns winning other prizes were not eligible for these prizes.

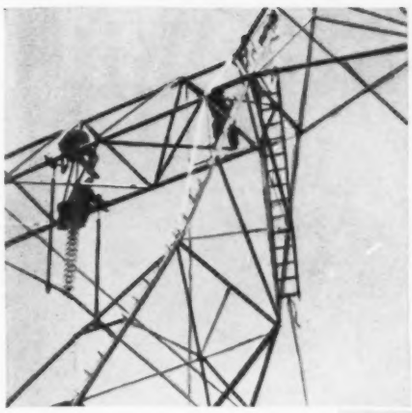
(4) Reflects inclusion of customers outside of city limits and on new rural lines in vicinity, since conclusion of the Home Town Contest.

Disk Replaced by T.V.A. on Live 154-Kv. Line

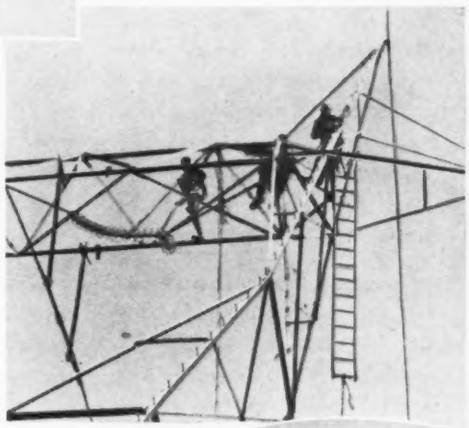
Foreman Snaps Shots of Maintenance on Wilson-Columbia Dam Line — Instructive Stages of Live-Line Operations

By EARL TAYLOR
Division Foreman Tennessee Valley Authority
Wilson Dam, Alabama

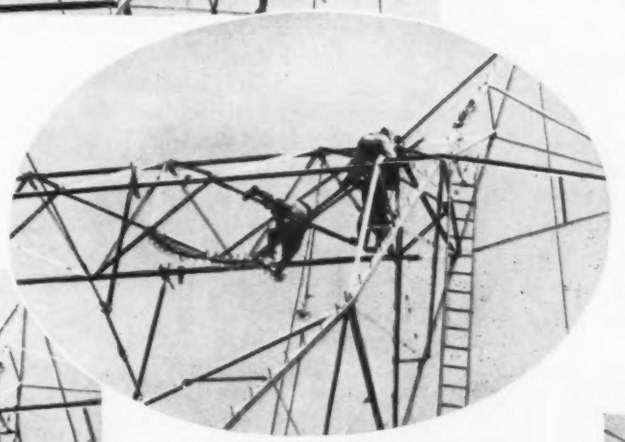
REFINEMENTS in live-line maintenance tools in recent years make work on 154 kv. comparable in ease and safety with maintenance work on distribution lines. Careful planning of the job and skillful handling of tools, however, are still necessary to "safe" and successful "hot-line" work. These pictures show what can be done with standard tools in the hands of competent men. In this instance a broken disk in a nineteen-unit suspension string is being replaced.

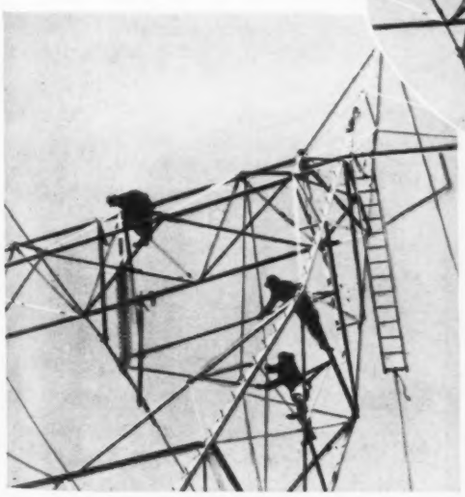


TOOLS ARE IN PLACE— Two suspension link sticks, holding the conductor, are being raised by ratchet strain jacks attached to the tower by crossarm brackets. This operation relieves the insulators of the weight of the conductor.



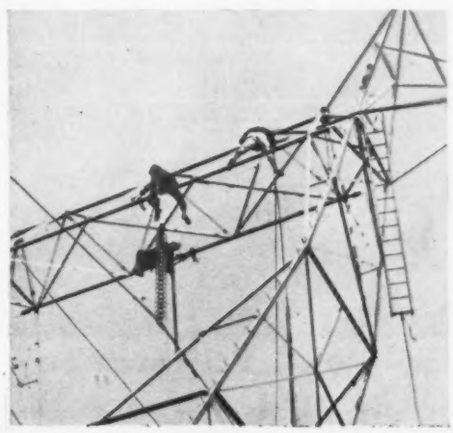
COTTER KEYS HAVE Been Removed — With the insulator string disconnected from the hardware on the conductor, using a cotter key remover and replacer, the string is being raised with a shepherd's hook so the defective disk can be removed.





REPLACING THE DEFECTIVE UNIT—With the shepherd's hook still holding the string, a towerman removes the broken unit (it was the second one) and puts in a new disk, seen still on the hand line.

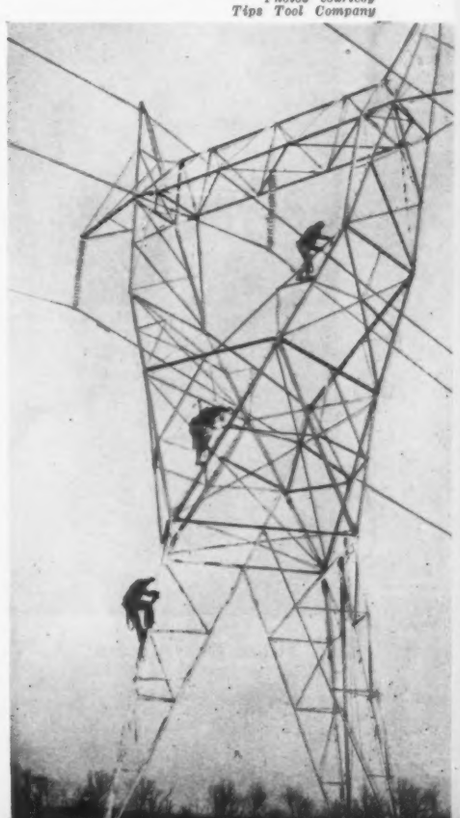
REATTACHING THE STRING—The broken insulator has been replaced, the suspension string lowered into position and it is now being attached to the conductor.



TOOLS ARE REMOVED—Towermen remove the suspension link sticks and other live-line tools and carefully lower them to the ground.

THE JOB IS DONE—Having completed the lowering of the tools, the men come down the tower leg to pack them away in the trailer. An article on care and transportation of hot-line tools used by T.V.A. appears on page 102 of this issue.

Photos courtesy Tips Tool Company



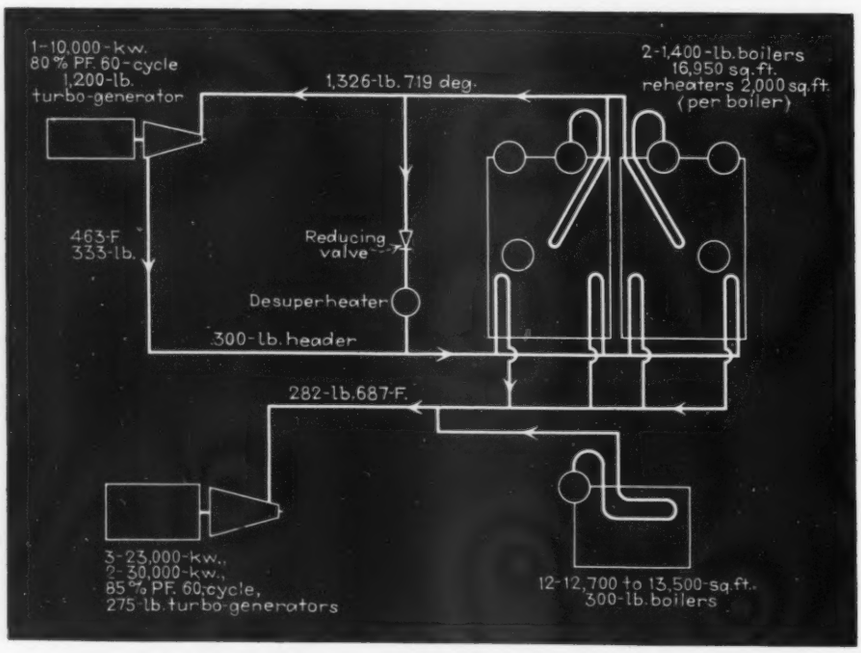
Operating Experience With

Lessons Learned on Pulverizers, Water-Walls, Superheaters, Economizers, Blading Scale, De-slagging, Erosion and Warming-Up Period

EIGHT years ago a pair of high-pressure boilers and a superposed turbo-generator were installed in the Northeast station of the Kansas City Power & Light Company. In this installation there are two 1,400-lb. Ladd three-drum boilers, which operate normally at 190,000 lb. evaporation per hour and are capable of generating 225,000 lb. per hour. They are fired with pulverized coal furnished by three Raymond impact mills per boiler. Originally there were nine Lopulco down-shot burners; later, nine auxiliary burners were added in the front wall just over the water screen. This caused more turbulence and shortened the flame travel 10 or 15 ft.

Maintenance on pulverizer mills is rather high. To reduce hammer costs a set of junk hammers is now used along with a set of good hammers. The junk hammers are placed on a rod closer to the edge of the disk than the good hammers. One pound of additional metal is worn from each junk hammer and the amount of coal pulverized per hammer is increased from 54 to 63 tons. Due to the high maintenance this type of mill will not be used on base-load units in the future. The third high-pressure boiler now being installed will be equipped with Raymond bowl mills and the pulverizing maintenance is expected to be reduced to one-fourth that of the present. After the new boiler is in service one Harding mill will replace the three impact mills on one high-pressure boiler. This will give a comparison that will be of value in making future changes.

The furnaces are water-cooled and at normal rating liberate 20,000 B.t.u. per cubic foot. In the original installation the reheaters were located behind and protected by water-wall tubes. This gave only 125 deg. F. rise instead of the 250 deg. F. desired. Eight changes were made on each boiler before the full rise was obtained. The final result of these changes was the removal of twelve water-wall tubes in each side-wall and the addition of reheater elements with one leg exposed to the fire. These were supported to the remaining water-wall tubes. To reduce overheating the exposed legs were connected to the inlet header and the thirteen elements in the center section have the exposed leg calorized. However, numerous replacements are still necessary. Although each element lost reduces the steam temperature about 3 deg. F. they usually are not renewed until the end of a 60-day boiler run. This reduces boiler outage as the elements can be blanked off at the header in about two hours time. The higher reheat temperature has increased the maintenance considerably, but the fuel saving more than justifies the higher cost.


1-10,000-kw. 80% PF. 60-cycle 1,200-lb. turbo-generator
1,326-lb. 719 deg.
2-1,400-lb. boilers 16,950 sq. ft. reheaters 2,000 sq. ft. (per boiler)
463-F 333-lb.
Reducing valve
Desuperheater
300-lb. header
282-lb. 687-F.
3-23,000-kw., 2-30,000-kw., 85% PF. 60-cycle, 275-lb. turbo-generators
12-12,700 to 13,500-sq. ft., 300-lb. boilers

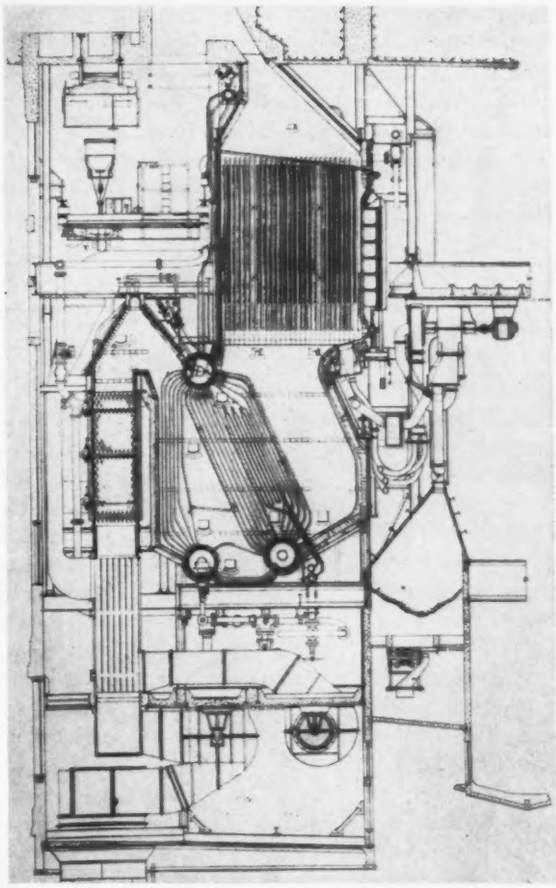
Steam flow diagram of 275-lb. and 1,200-lb. units at Northeast station

In the near future the convection or primary steam temperature is to be increased from 715 deg. to 815 deg. by removing one row of boiler tubes and increasing the superheater surface. The water-wall tubes will be reinstalled and the hot zone reheater elements removed. This should reduce the maintenance and maintain the present rating and outlet steam temperature. Newer installations are avoiding this type of reheater. The new 1,400-lb. pressure boiler now being installed will have the convection type reheater. Straight-through turbines and higher primary steam temperatures have made reheat less attractive.

Cuts on the economizer tubes were

Superposition

By RAY WINTERS
Kansas City Power & Light Company, Kansas City, Mo.*



Two of these boilers in Northeast station, Kansas City

caused by the soot blower jets impinging directly on the tubes. The low superheated steam used in combination with ash that had collected in the soot blower tubes caused rapid erosion. Since the elements were relocated and supplied with higher-temperature steam, no further cutting has taken place. However, some tubes already weakened caused trouble. Such leaks usually result in the cutting of adjacent tubes. Most of the defective tubes have been removed and very little outage can now be charged to economizer tubes. Many of the tubes were replaced after cutting out the affected section and welding sections together with an extension section welded on the end. These tubes were tested at 1,700 lb. pressure before replacing. Some have been operating six years and none has given trouble.

Outage due to leaky economizer cap gaskets was finally eliminated by reboring the header boxes and using taper plugs with a copper ferrule. These may leak when starting up, but can be tightened or hit with a hammer to stop the leak.

The blast action of the fly ash caused several boiler tube failures. This occurred where the baffles had leaks at the bottom of the second and third pass and at the top of the second pass where a soot blower apparently caused the ash to flow in a restricted area against the tubes.

Scale in the turbine

Turbine scale was a source of considerable trouble and economy loss. The files were filled with data collected on feedwater changes and possible remedies. Some were beneficial in that continuous operation could be maintained by frequent turbine washings with saturated steam at reduced load. Washing, even when very carefully performed, is associated with a certain element of danger to the unit. The installation of steam washers in March, 1934, brought these troubles to a close. By using condensate feed and maintaining low boiler-water concentrations, below 290 p.p.m., no turbine scale is formed. The washer consists of eight ½-in. mesh screens extending from below the water line to the feedwater box and baffle located in the top of the drum. The steam must pass through the screens over which the feedwater is spilling. Thus the concentrated boiler water and foam carried over is diluted or washed out of the steam. Since installing the screens an attempt to feed treated make-up, which made it necessary to carry higher boiler-water concentrations of 800 to 1,400 p.p.m., again resulted in a reduction of turbine load due to scale.

Boiler water

The boiler-water concentration is controlled by a constant blow-down system and daily water analysis. The blowdown water from the 1,400-lb. boilers is discharged to the make-up heater for the 300-lb. boilers. This reduces the make-up requirements, saves chemicals and supplies make-up to the 300-lb. boilers, which is from 150 to 250 p.p.m. lower in concentration than that of raw water make-up.

With the condensate feed very little sludge is formed, but the boilers are brought down every 60 days and washed out to prevent the possibility of plugged tubes. This sludge seems to stay in suspension when the boiler is steaming, but in order to prevent any congestion when the circulation stops a boiler that comes down for any purpose, especially if it has been operating any appreciable time, is usually opened and the sludge flushed out.

On two occasions tubes have failed because they became plugged. This started the regular washings. The load, when lost suddenly on these high-capacity units, is not easily absorbed by the system and usually any precaution against such an outage is justified.

Starting the boilers

Every installation must have its own operating procedure, but it may be of interest to note the method followed in bringing these high-pressure units on the line. The first boiler is brought up in a manner similar to the 300-lb. boilers, except that the side-wall reheaters are cooled by steam from the 300-lb. steam header. This steam is desuperheated in a 1-in. line which passes through a cold water line. After passing through the reheater it is discharged through a 1½-in. line to the drain. Further to protect the reheaters, the burners next to each side-wall are blanked off in coming up. As soon

* Paper presented to Missouri Valley Electric Association.

as the pressure reaches that of the 300-lb. header the boiler starts steaming. Steam passes through the by-pass line and reducing valve to the reheater inlet. A water jet at each inlet controls the reheater outlet temperature. The drain line is then closed and the cooling steam shut off. From this time, about two hours more is required to bring the boiler up to pressure. This reduces the possibility of stresses being set up in the boiler and gives time to check expansion.

Considerable expansion takes place due to the height of the boiler and the high temperature change due to high pressure, and inspections must be made to see that all lines and valves have clearance. The blow-off lines from the rear-wall mud drum have only $4\frac{3}{4}$ in. clearance when cold. The movement at this point is 3.5 inches. Any obstruction might break the lines or valves.

Movement of the suspended lower drum is one inch. Air leakage results, and it is necessary to seal broken joints each time the unit is brought into service. Stack CO_2 below normal must be maintained until this leakage is sealed. Any attempt to operate with normal excess air at the stack will slag up a clean boiler quickly.

The method of bringing up the second boiler differs somewhat from that of the first. Reheaters are cooled by steam from the first boiler and the temperature of the reheaters is controlled by water injection at the inlet headers. The quantity of water used is judged by observing the outlet steam temperature of each reheater.

It is also necessary to flood the convection superheater because no steam can be generated by this boiler until the pressure has reached 1,150 lb. The pressure of the first boiler is reduced about 100 lb. and the time allowed in bringing up the second boiler is shortened in order to hasten steaming and thus keep the superheater from overheating.

Turbine operation

The 1,200-lb. pressure, 3,600-r.p.m. turbine is brought up to speed in from about forty-five minutes to one hour when the unit is warm. If it has been down for some time and the heavy metal is cold, two hours warming time is required. A deflection indicator is used to determine the condition of the shaft. The exhaust discharges to atmosphere up to about 3,100 r.p.m. and is then cut into the 300-lb. heater.

OUTAGE RECORD GOOD

It is not the writer's intention to convey the idea that trouble and outage are the only things that can be expected from high-pressure units. These boilers have operated 84 per cent and the turbine 90 per cent of the time during the last five years, which is probably as good a record as that of many lower-pressure units. Troubles on high-pressure units are magnified because of their high efficiency.

At a 1,500-kw. load the turbine rotor, which was backed off 0.03 in. when it was brought down, is pulled up 0.005 in. After two hours operation it is closed another 0.01 in. In one or two hours more it is brought to operating position.

When the two 1,400-lb. boilers are carrying the system load the fireman has control of the 1,200-lb. turbine and maintains the 300-lb. header pressure by changes in the turbine load. Normal load fluctuations can be taken care of in this manner with fewer changes in the boiler firing. The regular operator can take the control in case of trouble.

If the high-pressure turbine trips out the steam supply to the 300-lb. turbines is stopped. The boiler operator then trips a quick-opening valve by push-button, allowing the steam to go through the by-pass line in proportion to the opening in the motor-operated reducing valve. On such occasions a few seconds may mean a considerable drop in 300-lb. header pressure. The plug-type reducing valve has a characteristic such that the first $4\frac{1}{2}$ in. of movement, which requires about 25 seconds, increases the steam flow very little. During the next 4 in. of movement its capacity rapidly increases. Therefore, the valve is always kept open about 5 in., or to a point where 100,000 lb. of steam will immediately pass when the quick-opening valve is operated.

On two occasions this valve failed to trip, once due to dust on the solenoid points and again due to the sticking of the by-pass valve. This by-pass valve equalizes the steam pressure and allows the compressed springs to open the main valve. High-temperature steam, caused by the temporary stoppage of steam flow, is believed to have been the cause. The metal in the valve had grown and it was necessary to dress it down to insure free operation. After the valve failed to trip it was necessary to open it by hand. When the piping arrangement is changed to accommodate the new 350,000-lb. capacity, high-pressure boiler, this valve is to be equipped with a motor which can be operated if the trip fails.

Slag in the furnaces

Working inside boilers with furnace chambers of this height is dangerous due to falling slag. Sometimes 300 or 400 lb. of slag falls at one time and the water screen tubes have been bent out of line as much as 2 ft. Before starting repairs it is necessary to slag the boiler. Men with steel helmets set up a swinging scaffold on the water screen tubes under the arch. The scaffold is then pulled to the top of the furnace by chain blocks, where the men enter and slag the boiler as they descend. The cleaning operation takes eight men eight hours. As one day is required for cooling, two days elapse before any repair work can be done in the furnace.

Good performance of valves and piping

Valves and piping did not cause as much trouble on the 1,400-lb. installations as on the 300-lb. boilers when they were first installed. The nonreturn valves have stuck a few times due to metal growth, but when the 300-lb. units were new warped valve bodies, porous castings and pitted valve trim were common occurrences.

Except for the main steam header, most piping joints were installed with soft gaskets which would not hold. These were replaced with mild steel corrugated gaskets by the construction crew, and except for occasional leaks from soft gaskets, which they failed to change, no further trouble has occurred.

More effort is exerted in keeping these units in continuous service than is the case with the 300-lb. units, not because of their unreliability, but because of their high capacity and high efficiency.

Product Improved by Electric Heat Treating

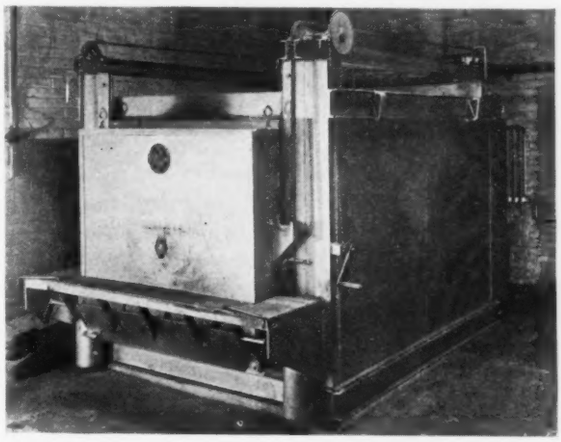
Rejects Reduced, Time Saved and Processing Stabilized in Chuck-Making Factory

By L. H. KNAPP
Sales Manager, Hartford (Conn.) Electric Light Company

TO MEET the heavy demands put on small tools by modern high-speed production methods the Jacobs Manufacturing Company of Hartford, Conn., maker of drill chucks since 1902, has recently electrified its heat-treating department.

In choosing electric furnace equipment the main consideration was to improve the product, but at the same time careful thought was given to the cost of equipment as well as to operating costs. How successful the Jacobs company was in attaining these desired ends may be gaged by the fact that after several months' operation it reports a greatly improved product, with costs no higher than when the former fuel-fired furnaces were in operation. The heat treating of the five major parts, which is essential in producing drill chucks, consists of a large amount of pack carburizing, hardening and tempering.

Formerly, one class of work was heated in an open fuel-furnace and then, to obtain selective hardening, each part was put by hand into a jig and drenched. This was not only tedious but not altogether satisfactory, as there were many rejects due to improper hardening.



Rejects ceased to be a bugaboo after this 72-kw. carburizing furnace was installed

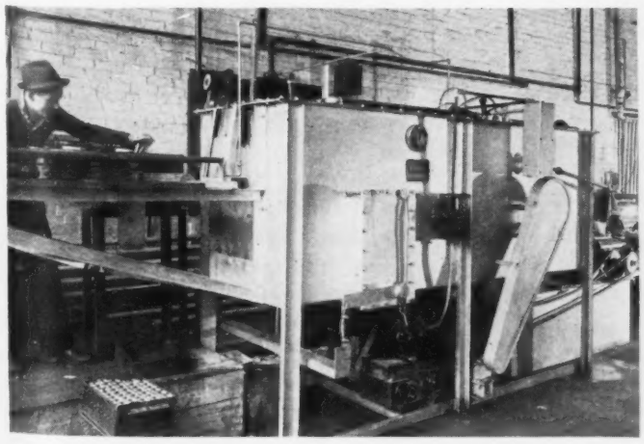
With another class of work, requiring a light case-hardening, the pieces had to be quenched directly from the carburizing furnace, for it was impossible to reheat parts without causing decarburization and the consequent loss of hardness. This again caused many rejects and necessitated much inspection work in order to eliminate the imperfect parts.

Aim is faultless product

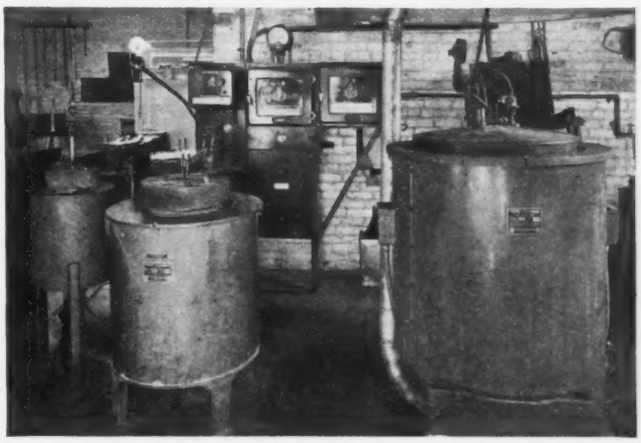
Inspection, therefore, was a costly and important step in the manufacture of these chucks, since every effort has always been made to turn out as faultless a product as possible.

Results have shown that with the present electric carburizing furnace more accurate work can be obtained, and at the same time the cost of op-

[*Continued on page* 123]



24-kw. G.E. atmospheric furnace enables hardening to be continuous and automatical with high-quality production



Leeds & Northrup "Hump" (11 kw.), "Homo" (20 kw.), oil heating (1 kw.) furnace for hardening and drawing

Functional Aspects of Wiring in Building Design

Permanent or Built-in Wiring Must Provide for Raceway Adequacy — Application or Outlet Wiring Must Be Accessible and Adaptable to Changes in Use and Occupancy

By CHARLES G. BEERSMAN
Architect, Chicago, Ill.

WATER, sewage and heating services are provided in a building as permanent parts of the structure, not expected to be disturbed nor materially revised during the useful life of the building in the purpose for which it is intended. Wiring, on the other hand, is installed, adequately or inadequately as it may be, according to the standard of the day, as a permanent part of the structure, it is true, but always with the reservation in the designer's mind that it is a variable element and can be torn out and replaced when and if the demands upon it exceed its capacity. In effect, the difficulty has been and still is that wiring is included in the design when what should be included is not wiring, but provision for wiring.

There should be no necessity to tear out or to destroy any part of the building structure in order to get at conductors or to install new ones when new electric services are desired. It should be possible to add these services, whatever they may be, as the future discloses them, without cutting into walls or ripping up floors, etc. And I believe that it can be made possible.

The wiring in any given installation for the general services of lighting and of small heat and motor applications, such as in a home or in the ordinary commercial place, can be considered as being in two fairly distinct parts. For convenience in speaking of them let us call one part the supply wiring and the other the application wiring.

From the point of view of the architect and of the builder, the supply wiring should include all that may be considered as permanent in the structure. This means all conductors that may reasonably be inclosed within the walls and floors of the building. As a rule too much of the wiring is built in, and since we have been doing this for many years we are now faced with the necessity of ripping buildings apart in order to make their wiring adequate for the demands of today. And since we are designing today's wiring in the same terms we shall very probably have to rip it out to satisfy tomorrow's demands.

The function of the supply wiring, the permanent wiring, is to make available in every place in the building as much electricity, within reason, as may ever be wanted in any particular place. How much and in what way electricity may be applied in any room will be determined by its use and occupancy. It cannot be expected that permanently installed wiring can be of sufficient flexibility to satisfy all the demands that may be made upon it by future changes in use and occupancy without having to be moved, revised, extended or, perhaps, torn out entirely and reinstalled.

It is the function of the application wiring to be adaptable to the changes of use and occupancy, and therefore should be accessible from the surface

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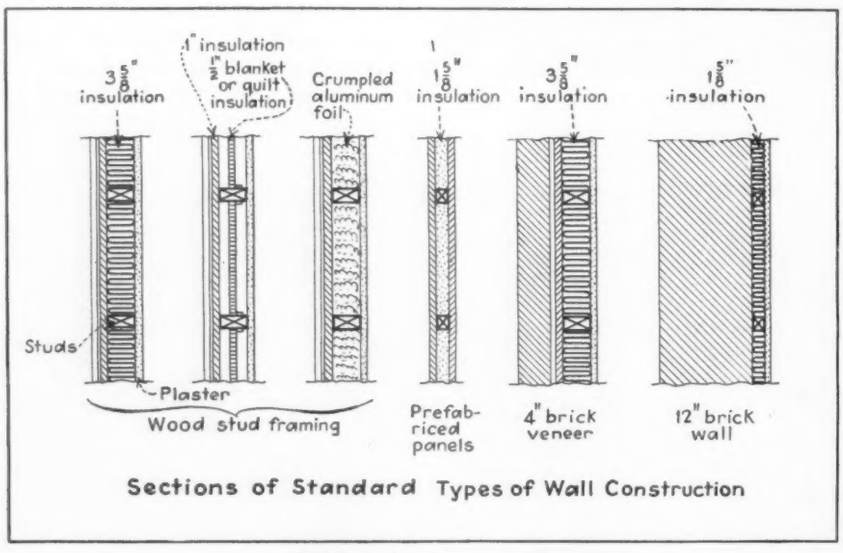

Sections of Standard Types of Wall Construction

Built to be torn apart?

Various types of wall construction used in modern buildings and designed for specific functions of support and heat insulation. By what authority does the electrical industry assume the right to cut into these structures, thus impairing them in the performance of their primary functions, in order to adapt them to changed ideas in regard to their incidental function of inclosing electric wiring? It seems more reasonable that supply electric wiring should be so devised as to require no impairment of the structure after its erection.

"Sohio" Modernizes With Mercury Lighting

New Installation in Cleveland Is Devised to Provide Higher Intensity With Lower Wattage

By E. B. KARNS
Westinghouse Electric & Manufacturing Company, East Pittsburg, Pa.

THE importance of adequate illumination for service stations has long been acknowledged by major oil companies. Alert and progressive service station operators years ago discovered that good lighting is an invaluable advertising agent. The business-like operator today knows that "light attracts" and has been quick to visualize the possibilities of lighting effects for the further enhancement of his station's "drawing power"; not satisfied with merely *good* lighting, he must have light which will make his station stand out in sharp contrast to its surroundings.

There are two means by which this contrast may be accomplished—by providing a sufficiently high degree of illumination and by color. The mercury electric discharge lamp produces both results. Its distinctive bluish-white color is a real factor in its ability to attract the eye.

One of the first "super" stations of Standard Oil of Ohio to install mercury lighting is located at 55th Street and Woodland Avenue in Cleveland. This is not an elaborate lighting job, but a conservative job well planned by the oil company engineers to provide a maximum amount of light with a minimum wattage. It is selected as an example to illustrate the difference in operating cost between the mercury system and an incandescent system which would give the same intensity on the station drive.

The station consists of a large building, modernistic in design, located on a large corner lot. The lot contains approximately 12,500 sq. ft. to be illuminated. The lighting installation is comprised of nine 400-watt mercury lamps mounted on 25-ft. hinged steel poles and six 300-watt incandescent pump island lights. The pump island lights build up a higher intensity where there is greater activity and they also provide color correction.

With this method of lighting there is installed a total of 3,600 watts of mercury light and 1,800 watts of incandescent light, or a grand total of 5,400 watts. To obtain the same intensity on the station drive, using all incandescent lamps, would require 9,300 watts, an increase of 3,900 watts installed, or about 72 per cent.

Now, let us see what this means in operating expense, assuming a power cost of $0.04 per kilowatt-hour. This is a 24-hour station, so for estimating purposes we shall say the lights are in use eight hours per day, or a total of 2,920 hours per year. The difference in watts consumed between the two systems would be 11,388 kw.-hr., which at $0.04 kw.-hr. means *$455.52 per year savings* with mercury lighting.

During the past six or eight months Standard Oil of Ohio has put in some 20 to 30 mercury installations and all of the larger stations are being converted as rapidly as construction programs permit. From this it would seem obvious that mercury light has "proved" itself to Standard Oil engineers.

Mercury lighting has also solved another serious problem which has confronted many oil companies in recent years. That is the difficulty of inducing the lessee to keep his station adequately illuminated. With present-day keen and ever-increasing competition, a service station must be effectively lighted to draw the night trade which is essential for its survival. In numerous cases the lessee, who pays his own power bill, decides to reduce the wattage per floodlight or to turn out some of the units. He thinks only

[*Continued on page 120*]

Editorials

A Hedge on Taxes and Labor Legislation

FAR-SIGHTED negotiations of street lighting contracts by an Eastern utility management are now providing for offsets to possible increases in taxation and labor costs. A typical clause reads in part:

> If the company's costs of supplying service be increased directly or indirectly due to (1) the operation of any new type or form of taxes, and/or (2) increases in any tax rate or levy, and/or (3) legislation affecting hours of labor, wages or other conditions of employment, in addition to those in effect prior to Jan. 1, 1937, whether the same shall be imposed either directly or indirectly by federal, state, municipal or local authorities on the company, then the prices above set forth shall be increased proportionally.

The equity of including fuel clauses in power contracts was recognized long ago in situations subject to costly fluctuations of price. This later step of hedging on taxes and labor follows logically upon the pathway of the fuel adjustment, and deserves widespread consideration. If the present upward trend to taxes continues it may not be long before utilities will find such a hedge their only salvation on all contracts.

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Permanent Testing Circuits Warrant More Study

NOW that plants are generally being loaded more nearly to capacity, there is more necessity for a high degree of thoroughness and assurance in tests and checks made in the course of preventive maintenance. Schedules should not only be more frequent but every opportunity should be grasped to expedite tests by having test facilities and personnel provided. Certain kinds of check have to do with mechanical operativity and, in general, those observations have to be made at the piece of equipment. Relay disks must be free to turn, when contacts operate the circuit must be closed or opened and breakers must trip when tripping current is applied. Such tests require the circulation of an inspector or tester among the equipments.

Other tests have to do with deterioration progressing slowly over longer periods, and here, with equipment relied upon for more continuous output, the risk is that the interval between tests may happen to prove just a bit too long. The neatest way to avert that hazard would appear to be to convert testing to an almost automatic function by providing centralized test panels connected by permanently installed test circuits. Some stations already have test buses of this sort, others are acquiring them incidental to modernization, but there are others which do not. For those stations the time is ripe to study the feasibility. The moot question as to whether testing is too infrequent vanishes if the routine periodic test with portable facilities at the equipment can appropriately be superseded by regular log-recorded readings taken at a central point by means of permanent test circuits.

Insulation failures are still with us, and they carry a large element of uncertainty because there is lacking a generally applicable means of telling positively how much deterioration has taken place in winding insulations. Perfection of such a technique would add greatly to the justification of a test-circuit installation and thus give opportunity for more frequent observations of the approach toward the hazard of ruinous failure under load.

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Steam Power Generation Technology Marches On

THE announcement by the American Gas & Electric Company of the new 2,500-pound, 940 deg. boiler and cross-compound turbine for the Twin Branch plant of the Indiana & Michigan Electric Company is almost electrifyingly startling. Yet, as a matter of fact, it will not come as a full surprise to those who have participated in the development of higher pressures and temperatures in the United States over the past fifteen years or so, nor to those who have followed the totally different direction engineering has taken in the last decade in the development of higher boiler pressures on the European continent. To all of these it has been evident for some time that the present level of pressures and temperatures centering around 1,250 pounds and 925 deg. was not the ultimate, and that further development was almost inevitable.

While an evaluation of the complete significance of the Twin Branch development will have to wait on the announcement of more technical details, it appears possible to sketch this in roughly from the information disclosed. Thus, it is significant that in an existing 600-pound plant additional capacity is not being added either by superposition nor by duplicating existing pressures, but that, on the contrary, capacity is being increased by going to a pressure over four times the existing pressure and to a temperature very close to the present suspected steam dissociation corrosion limits.

Again, it is significant that when such pressures were called for, outstanding American manufacturers

were found either ready with developments or willing to undertake them. Still another point of outstanding significance is the definite choice to develop to the utmost limit the possibilities of the natural circulation boiler before experimenting with the many known and unknown difficulties of the forced circulation boiler. Finally, the association of the particular utility group with the group of manufacturers involved in the project gives ample assurance that the economics of the project have been thoroughly explored and that, therefore, the competitive position of hydro power as regards steam power will be further weakened.

A great many questions almost automatically come to mind that one would like to see answered in connection with this development, such as the cross-over pressure selected, whether or not reheat is being employed, the general cycle and the physical construction of the boiler, turbines and pumps. On all of these the ELECTRICAL WORLD hopes to be able to furnish information in the near future.

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Giving the Kilowatt a Crown

"WE HAVE to admit a lack of showmanship, a lack of the ceremony and the glamour that appeal to and are loved by the rank and file," Davis M. DeBard last month told the Canadian Electrical Association convention. What the industry needs to do, said Mr. DeBard, to impress the true value of electric service upon the minds of the public is to "give the kilowatt a crown."

For Exhibit A in any program to give the kilowatt a crown, we wish to submit the Georgia Power Company's "Champion Home Town Contest," whence came the unheard-of scene of the man in the street whooping it up for the kilowatt-hour and taking great pride in running up amazing totals of average usage as he adopted complete modern electric service as his own.

This activity, described in this issue, was a load-building job, it is true, which added 150 kw.-hr. per year to the average customer's bill, resulted in outstanding records for average residential usage in communities as a whole and gave to load building a momentum which is still an effective force in the company's selling progress. But in addition, and threaded all through the story, is in effect a second story of equal value to the modern-day utility operator—the story of a practical means of winning the favor of the man in the street, and doing so on a self-supporting basis.

This story, now told completely for the first time, reveals that Messrs. Collier, Marsh, Jackson and Stafford, in conjunction with the company's 4,400 employees, in achieving these two goals of major importance, did something that seems to be one of the first practical answers to an oft-repeated plea of the industry's leaders. As such, we commend the Georgia Power story to the operating companies of the industry. At the very least, it shows one way to "give the kilowatt a crown."

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Better Selection of Engineering Students Needed

AS THE 1937 engineering graduates begin their professional careers we are once more mindful of the boys who next fall will enter our colleges in search of an engineering education. In many cases, as in the state engineering colleges which must accept all graduates of the high schools, much effort is wasted and ambitions thwarted by the entrance of many students who are quite unfit to be engineers but who may have latent aptitudes for other professions. Proper guidance might prevent much of this waste of effort and money and subsequent disappointment.

Engineers can aid the colleges by contacting with parents and by honestly advising these people whether or not the boy may become a successful engineer. Every engineer who knows of a high school boy contemplating engineering should make it his special obligation to cultivate that boy's acquaintance and determine his probable fitness as a future member of the profession.

Many boys can be guided in their choice of a career by securing a summer job where they can observe the practical side of engineering. These jobs are now available and such experience is of the highest value.

Assuming that a boy has the desirable qualities, into what branch of the profession should he enter? Much might be said for each branch, but let us consider only mechanical and electrical engineering.

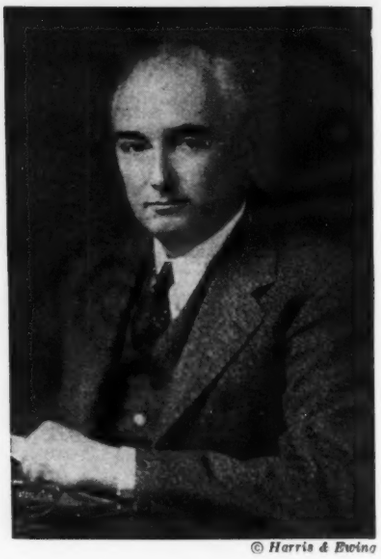
Power plant extensions are being planned and built which will require skilled engineers, some to build and some to operate. The latter position in general assures one of steady employment, with increasing pay as added responsibilities are assumed. Power companies have added few technical men to their staffs for some years and there will be interesting opportunities in such work for the proper men.

Manufacturers complain of the lack of competent mechanical designers of electrical machinery. Men are needed with training in problems of vibration, plastic deformation, fluid flow and the characteristics of metals. Possibly our colleges need to revise portions of their courses to provide the needed instruction in these important topics. This does not mean additional courses, but may entail dropping some of the less important topics now discussed.

The nation needs a better selection of engineers rather than more engineers, and the new carefully selected men should be guided into those branches of the profession in which there exists the greatest demand for engineering talent.

Three Years to Win Public Opinion

By CARTER FIELD



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This noted journalist gives his personal comments and interpretations on current happenings affecting the electrical industry. His background and his location at Washington make his thoughts informative and interesting even though all may not agree with him

THE whole future of the electrical industry in the United States will be profoundly affected by political developments between now and June, 1940. That is the date of the Democratic national convention which will nominate a successor to Franklin D. Roosevelt. Or renominate him!

The first phase will be the session of Congress which will convene this January, when the Norris "Seven TVAs" legislation will probably be passed, and other measures affecting the electrical industry considered.

The second phase will be the primary and election campaign of next summer and fall, in which more than 32 senators and all 435 members of the House will be nominated and elected.

Then will come the first session of that Congress, convening in January, 1939, at which all sorts of legislation affecting the industry will be proposed.

Finally will come the selection of delegates to the national convention, and the convention itself.

The present tide must be turned before that if the privately owned electrical industry in this country is to stay intact. The handwriting is on the wall. Those now in power want government ownership—*in toto*—so far as the electric industry is concerned. Some very shrewd observers and economists believe that pursuance of the New Deal policies will eventually lead to complete government socialism. That is a debatable question, but there is little doubt where Mr. Roosevelt stands. He does not like the idea of government ownership of *everything*, but he is very strongly for government ownership and operation of everything electric!

Six months ago the prospect was just as clear as it is now, but the situation has suddenly become of intense interest because there is a *possibility*—it would be dangerous to use a stronger word—of a turn to the right. The spectacular thing that has happened has been the defeat of Mr. Roosevelt in his plan to enlarge the Supreme Court. But there have been less spectacular developments which just may prove to be straws in the wind.

Turn to the right

Of tremendous significance is the fact that Mr. Roosevelt was obliged to turn to the "regulars" in the last-minute negotiations which led up to the sidetracking of the attack on the Supreme Court. Consider the four men who went to the White House to talk over the plans. There was Speaker John Nance Garner—he who had split violently with the President on the question of law and order involved in the sit-down strikes, and also over continued unbridled spending by the government. There was Pat Harrison, chairman of the Senate finance committee and a conservative at heart, though an intensely loyal party man. There was Key Pittman of Nevada, of whom the same can be said. And there was Alben Barkley, the nearest approach to a radical of the four, but a politician of eminent practicability.

So in a way it may be said that so far as White House counseling is concerned the starry-eyed dreamers and wild-eyed reformers are in temporary eclipse. Their ideas may still appeal, but their rating on sound political judgment has suffered a severe setback.

Coming on the heels of more or less of a revolt against Brain Trust drafting of legislation, this recognition of the regular political leaders is highly important. It may be prophetic. It is a far cry from the days of the public utility holding company death sentence, when a Brain Truster actually sat in the meetings of the conference committee which was compromising the House and Senate drafts of that bill.

While probably, for the sake of the appearance of harmony, Democratic leaders will be most loyal to the President for some time to come, there nevertheless has been a definite change of course. The President, for instance, would not be able today to do what he did in that death sentence fight. There has been a slight step back toward more power for the legislative branch of the government—less for the executive.

Although it is easy to exaggerate the length of this step, the point here is simple, but not generally understood. Gradually more and more senators became convinced that it would be just as dangerous for them to vote with the President as against him. When that state of mind is reached, on *any* issue, congressmen will vote as they think best for the country. There are exceptions to this rule, of course, but the degree of statesmanship and intelligence on Capitol Hill is much higher than generally thought. It's just that they are not willing to do a martyr act. Statesmanship rushes to the surface when personal fear is eliminated.

All of which leads up to the fact that the next three years is a golden opportunity for the electrical industry to get public opinion on its side and enlist public opinion *against* government ownership. And the industry will do it—*or else*.

News OF THE WEEK

New Power Development Planned by American Gas & Electric Sub

Indiana & Michigan Electric to install 62,500-kw. combination compounded unit to cost $4,000,000 — Marks advancement in power generation practice — Tidd says pressure and temperature sets record

A new advancement in power generation practice will be undertaken by the American Gas & Electric Company when one of its principal subsidiaries, the Indiana & Michigan Electric Company, constructs an extension to its Twin Branch plant at Mishawaka, Indiana.

The new 62,500-kw. combination compounded unit, with accessory equipment, will entail an expenditure of $4,000,000. The new plant will operate at the record high pressure of 2,500 pounds per square inch and at a temperature of 940 degrees.

Pressure at record

George N. Tidd, president of American Gas & Electric, said that this pressure is almost double that of the most modern plants that are now being installed and the temperature is also higher than used in any other plant now in service.

"This development of rather extraordinary pressures and temperatures is another step in the company's consistent policy of generating power in the most efficient manner that the engineering art can provide," Mr. Tidd said. "Although somewhat higher pressure plants have been built in Europe, none of these have really been on a large commercial scale. Further, forced circulation was required in all of the European boilers and none of the installations has been at as high a temperature as is proposed for Twin Branch. In contrast to the small European high-pressure plants, the Twin Branch extension will be done on a commercial basis with the usual full consideration given to the financial soundness of the investment."

Contracts awarded

The General Electric Company has been awarded the contract for a 22,500-kw., 2,400-pound turbine generator which will be cross-compounded with a new 40,000-kw., 400-pound pressure turbine generator. Mr. Tidd said that the contract for the 2,500-pound pressure boiler with coal pulverizing mills and accessory equipment has been awarded to the Babcock & Wilcox Company. The 3,000-pound per square inch boiler feed pumps, which are a vital part of the installation, will be built by Ingersoll-Rand Company.

Mr. Tidd stated that the pressure of 2,500 pounds was selected as being the limit to which natural circulation boilers can be built. He said that any higher pressure would involve forced circulation of the water within the boiler by pumps with the attendant pumping difficulties which will be avoided at Twin Branch.

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Los Angeles Proposes to Buy Utility System

Plans to acquire the electric distribution system of the Southern California Edison Company in North Hollywood, Tujunga and Sunland by the Los Angeles Municipal Bureau of Power and Light have been presented to the City Council in three condemnation ordinances.

The commission, in an effort to furnish electric energy to metropolitan and annexed parts of Los Angeles, proposes to acquire, through court action, at an estimated cost of $5,000,000, Edison property serving approximately 45,000 customers in additional western sections of the city, including Eagle Rock, Venice, Watts, Sawtelle and Green Meadows.

The department recently purchased, at a cost of approximately $45,000,000, the generating and distribution system of the Los Angeles Gas & Electric Corporation.

•

Rhode Island Utility Plans New Generator

A $4,000,000 expenditure for additional capacity involving a 40,000-kw., 1,200-lb., 3,600-r.p.m., 900-deg. General Electric steam turbo-generator and a 430,000-lb.-per-hour Combustion Engineering Company boiler was announced this week by the Narragansett Electric Company, Providence, R. I., a subsidiary of the New England Power Association.

President Samuel C. Moore stated that this is the first major outlay for generating facilities required since 1925, although electrical energy consumption in the Providence area has virtually doubled in the interim, and the present peak exceeds that of 1929.

The new equipment will be installed at the Manchester Street station, a tidewater plant in the heart of the city adjacent to the South Street station. This station formerly supplied energy for the operation of the United Electric Railways, but was acquired several years ago by the Narragansett company. With the new equipment

in service the capacity of Manchester Street will approximate 70,000 kw., or slightly more than one-half the rating of South Street. Either coal or oil can be burned under the new boiler.

Contract for the design and construction of the addition at Manchester Street has been placed with United Engineers & Constructors, Inc., Philadelphia, and plans require completion by the spring of 1939.

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Utility Requests Considered by FPC

The Federal Power Commission has approved the merger of the facilities—including the transfer of licenses for its three generating stations—of the Chelan Electric Company with those of the Washington Water Power Company. Merger involves no cash consideration.

The hearing scheduled for July 29 on the application of the St. Louis Gas & Coke Corporation for approval of the sale of its electric facilities to the Granite City Generating Company has been postponed until August 10.

A hearing has been scheduled for August 23 on the applications of the Pennsylvania Electric Company and the Pennsylvania Edison Company for approval of the sale of the franchises and property of the former to the latter. Property includes FPC license for a 33-kv. transmission line in the Allegheny National Forest and designated as Project No. 1160. Applicants state that consideration for the sale would include the delivery to the Pennsylvania Electric Company of all its outstanding common stock —850,000 shares of no par value—for cancellation.

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Rhode Island Utility Seeks Permission to Issue Notes

Newport Electric Corporation has asked the Rhode Island Public Service Commission for permission to issue notes totaling $442,848 to meet part of the cost of a new addition and equipment of the generating plan, according to William P. Sheffield, president.

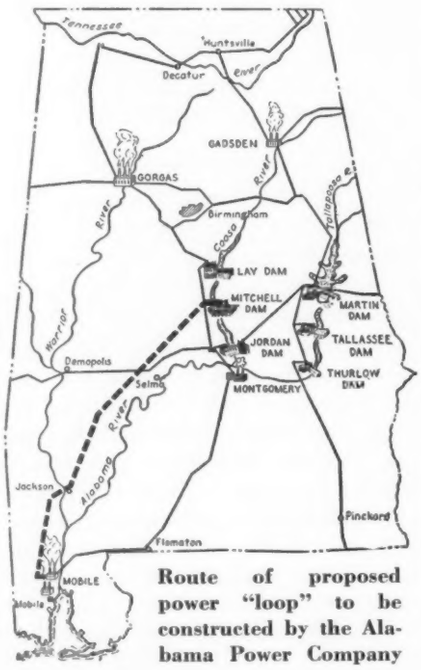
Mr. Sheffield stated that the cost of the equipment and the new addition will be approximately $500,000. The company seeks to issue $300,000 of 4½ per cent notes due in nine months and renewable thereafter to the Utilities Power & Light Company, Ltd., of Canada and to issue $142,848 of 4 per cent notes payable over 36 months to Westinghouse Electric & Manufacturing Company.

Alabama Power Plans New Power Line to Meet Industry Demands

New "loop" extending to Mobile to cost $1,700,000 and will double present available energy for South Alabama — Martin scores unfair TVA competition as preventing company from raising new capital

A new power "loop" for South Alabama which will more than double the present available power in the southwestern part of the state will be undertaken by the Alabama Power Company as soon as a certificate of convenience and necessity is issued by the Alabama Public Service Commission. The certificate was applied for July 21.

Construction of the additional high-voltage electric transmission line 187 miles long from Mitchell Dam to Mobile, with all equipment, will cost over $1,700,000, Thomas W. Martin, president, stated.



Route of proposed power "loop" to be constructed by the Alabama Power Company

Line connects plants

The new line, which will interconnect with the company's six hydro-electric plants on the Coosa and Tallapoosa rivers, and with its Gorgas steam plants, will connect at Salem with lines now serving that area, and from there will extend to Mobile, Mr. Martin said. The line will be a companion to another now serving Mobile at a distance approximately 50 to 60 miles eastward and thus result in a new power "loop" for that section.

"This will not only add to the dependability of the company's service in South Alabama, but will result in a substantial increase in power supply to meet the demand of existing and new industries coming into that section," Mr. Martin said.

It was pointed out by Mr. Martin that while the new line will operate initially at 110,000 volts, it will be so erected that later it can be changed over to 154,000 volts with a capacity of 60,000 kw. at this voltage, doubling present available power.

To spend $1,700,000

The company will spend more than $1,000,000 on the line and an additional $700,000 for terminal facilities. Its policy of using Alabama labor and purchasing from Alabama concerns for all materials which can be supplied from local sources will be followed. It is estimated that $500,000 will be spent for these items and that the payroll will be about $400,000 additional.

"On account of the threatened competition of the government through its agent, TVA, the company has for several years been unable to raise new capital," Mr. Martin said. "It has therefore financed its extensions out of available cash resources, but the larger program now ahead will before long make new financing necessary through the sale of securities. Unless this unfair competition condition is soon changed the company will be unable to finance the extension of its system to supply power requirements which will be demanded by new industries in many parts of the state."

Mr. Martin said that "because of the political nature of TVA it cannot readily solicit industries from other states to locate in Alabama. Therefore, it seems that, for the good of Alabama, nothing should be done which will hamper Alabama Power Company in its efforts toward the further upbuilding of the state."

Steam Power Plants Seen Having Advantages Over Hydro Projects

National Resources Committee says unit investment in steam stations is much smaller than in water power developments — Economic worth of federal projects questioned — Lynch urges power pools

The high efficiency and low fixed charges now possible in large fuel-burning plants place hydro-electric developments at a disadvantage in most sections of the United States, if low power cost is the objective, according to the National Resources Committee in its study of technological trends and national policy.

It was stated by the committee that water-power plants, due to their high fixed costs, depend even more than do fuel-burning plants upon a high use factor or load factor.

Steam plant advantages

Discussing the relative merits of steam over hydro plants, the committee stated that "hydro plants supplemental to steam plants are practical in numerous cases where steam is used for base-load service and hydro prime movers are available for peak or emergency conditions. It was also shown that unit investment in steam plants, which can be located at load centers, is much smaller than in hydro projects, which must transmit power over long distances to the point of use.

The report of the National Resources Committee brought forth comments as giving proof to statements of leading utility executives and electrical engineers questioning the feasibility and economic worth of the federal water power program and its gigantic projects scattered throughout the country.

Wendell L. Willkie, president of Commonwealth & Southern Corporation, stated in the 1936 annual report that in the vast coal-producing area of the Tennessee Valley electric energy can be produced by steam for two-thirds of the amount per unit that it can be developed by hydro.

It has been repeatedly pointed out by utility executives that the only way the government can justify present TVA rates is to charge part of the power cost to navigation, flood control or other phases of the agency's program.

Sees hydro costs higher

Bernard W. Lynch, president of Standard Gas & Electric Company, stated that any economic advantage that water power may have enjoyed stands a strong chance of being just the reverse today. Dependable hydro energy, when all the inclusive costs are accounted for, cannot compete on a cost basis as a general proposition with energy from fuel plants located at load centers, he stated.

"New hydro-electric developments face a number of engineering and economic handicaps," Mr. Lynch said. "Most important sites close to load centers and economical to build have long since been developed and those remaining are generally far from centers of population and require long transmission lines."

Mr. Lynch urged that if the government is set on developing giant hydro projects, then in order to insure cheap electricity the power sources should be merged and co-ordinated with existing power pools and distributed publicly by privately owned companies already engaged in that business at rates to give full benefit of savings.

•

FPC Sees Utilities Lacking in Capacity

Many utilities are now operating without adequate reserve capacity and with no immediate provision to care for their rapidly growing loads, the Federal Power Commission asserted in a letter to Senator Pope of Indiana, chairman of the special Senate subcommittee considering the Norris bill for the creation of seven regional conservation authorities.

The letter, signed by Clyde L. Seavey, vice-chairman of the commission, stated that utilities are trying to meet present and future demands by the purchase and installation of additional equipment. "We are advised, however, that electric equipment manufacturers are unable to guarantee deliveries of such equipment for many months in the future," he continued.

Vice-Chairman Seavey took exception to testimony given by John D. Battle, executive secretary of the National Coal Association, who stated that present installed generating capacity greatly exceeded the demand for electricity. The commission reaffirmed its statement of 1935 that on the resumption of normal industrial activity there would be a shortage of power unless immediate steps were taken to increase the generating capacity.

FACTORY LIGHTING—The new addition to the Monarch Machine Tool Company plant at Sidney, Ohio, was completed in 35 calendar days. The new bay, of 18,000 sq.ft., brings the total production space to 100,000 sq.ft. The latest type of mercury-vapor lighting system by General Electric Company is used throughout the plant

Regional TVA Program Opposed as Disrupting National Policies

Waterways association official tells House committee that Norris proposal is an attempt to control electric power under "camouflage" of resources planning — See bureaucracy in broad powers

Opposition to the regional power and conservation program sponsored by Senator George W. Norris, which would create seven agencies similar to the Tennessee Valley Authority, grew stronger this week as agricultural and navigation interests warned the House rivers and harbors committee that the plan would disrupt national farm, hydro-electric, flood control and navigation policies.

The grandiose scheme, it is charged, appeared to be an attempt by the federal government to control electric power under "camouflage" of resources planning, in the opinion of John H. Small, vice-president of the Atlantic Deeper Waterways Association.

Wide agency powers

The Norris proposal has met with strenuous opposition from the Agriculture Department, the Mississippi Valley Association, the Ohio Valley Conservation and Flood Control Congress, coal and other interests who see in the measure a government bureaucracy with wide discretionary powers.

Mr. Small said that electric power, flood control, navigation and other phases of the planning program seem "well covered by existing legislation" and he "could not understand the purport of the unusual powers to be conferred upon the regional authorities."

The division of powers under regional authorities would disrupt years of flood control, navigation and farm work, in the opinion of Rhea Blake, representing the Delta Chamber of Commerce of eighteen northwestern Mississippi counties.

Alan N. Jordan, executive secretary of the Ohio Valley Conservation and Flood Control Congress, told Senator Pope of Idaho, chairman of the Senate agriculture subcommittee, that the TVA dams could perform flood control, navigation and water power in single projects only "if the dams are built twice as high and the reservoirs twice as big as they would have to be for flood-control purposes."

M. L. Wilson, acting Secretary of Agriculture, wrote the Senate committee that the Norris proposal would duplicate the department's soil conservation activities. He added that if the legislation were put into effect as now drafted it would "make a national agricultural program a doubtful undertaking."

Assails bill's aims

The Anthracite Institute opposes the bill on the grounds that such legislation would be a severe blow to the entire solid fuel industry. John D. Battle, executive secretary of the National Coal Association, declared that "it is inevitable, if the proposed legislation goes through, that the government will be selling electricity in competition with other fuels at less than cost, and that the actual cost of such electricity will be lost in a maze of accounts, allocations and disputed claims. This is not conjecture; it is what is happening today under the Tennessee Valley Authority."

It was pointed out by Mr. Battle that "this proposal of Senator Norris is designed to fasten a public ownership policy on the government that does not want it, and at a cost that staggers the imagination. It is dishonest to the extent that it hides the power issue behind the skirts of conservation, navigation, flood control and such issues."

•

Jersey Stock Sale Authorized by Court

The New York Trust Company was authorized this week by Supreme Court Justice Philip J. McCook to sell 712,411 shares of Jersey Central Power & Light Company at auction. This action was taken over the protest by New Jersey Light & Power Company, Associated Gas & Electric subsidiary, that the stock may be sold for $9,000,000, although its actual value may be as high as $20,000,000.

New York Trust is trustee of $20,000,000 of National Public Service Corporation debenture bonds, which are in default, and the stock at issue is part of the collateral put up to support the indenture of February 1, 1928.

Justice McCook ruled that New Jersey Power & Light had no right to demand a pro rata distribution of Jersey Central stock to debenture holders, maintaining that if it and its subsidiaries wish a controlling interest in the stock they should pay for it.

•

State Rural Board Conflicts with REA

The North Carolina Rural Electrification Authority stood firm on its declaration that the earmarking of federal funds for an electrification project does not necessarily mean the project is feasible. The authority also reaffirmed its assertion that no project would be approved until the applicant had obtained a certificate of convenience and necessity from the state utility commission.

Handed what Chairman Dudley Bagley termed an "ultimatum" by a two-man delegation representing a Rutherford and Cleveland county co-operative, the authority declined to approve a project calling for the construction of 53 miles of line. The federal REA has promised a loan of $65,000 to the group.

•

Bond Conversion Proposed by Northern States Power

Northern States Power Company, (Minn.), has asked the SEC for authority to grant conversion privileges to the $5 preferred stock offered publicly on Feb. 11, 1937. It is proposed that holders of the issue be given the privilege of converting their holdings at the rate of four shares of common stock for each share of preferred.

The company offered 275,000 shares of preferred stock and $75,000,000 of 3½ per cent bonds.

•

English Electric Sells Unit

Announcement has been made that the English Electric Company of Canada has sold the business of the subsidiary formed last year, the Anglo-Canadian Electric Lamp Company. The

lamp company was formed to take over the business of "Barlux Tubelights" and to manufacture incandescent electric light bulbs.

Plans of English Electric to enter this field were developed in the depression years when the company's business in heavy electrical equipment slumped. Now the company is so busy with orders for equipment that there is no time to devote to the development of the light bulb business.

•

Michigan REA Projects Plans $300,000 Power Plant at Ubly

Engineering plans for a $300,000 power plant at Ubly are being made by the newly formed Thumb Electric Cooperative of Michigan, according to Frank Wilson, president.

Two acres in Ubly have been donated by the village as a site for the new plant. Mr. Wilson stated that REA has completed a contract for a $2,000,000 loan to the new company, which will build 1,800 miles of line to serve 5,500 homes in Huron, Tuscola, Sanilac, Bay and Saginaw counties. Project is the largest in the country.

•

Linemen Use Salt Tablets

Alabama Power Company is equipping its outdoor men with salt tablets, which may be dissolved in the mouth, to keep up their vitality for long periods and to prevent heat exhaustion.

Authority Set in Bonneville Dam Power Measure Passed by House

Mansfield Bill creates administrator to sell surplus energy generated at federal project on Columbia River — Army Engineers in control of flood and navigation feature — FPC to approve rates

Legislation setting up machinery for the disposition of power from Bonneville Dam, the giant federal hydroelectric project on the Columbia River, advanced another step this week when the House passed the Mansfield bill and sent it to the Senate.

The Senate, by unanimous consent, recommitted the McNary bill, which is substantially the same as the Mansfield bill, to its committee on commerce with instruction to eliminate the section relating to rate revision at Boulder Dam. The motion by Senator McNary of Oregon came after the House had rejected the entire section of the Mansfield bill referring to Boulder power rates.

The House bill, as finally approved, provides:

1. Appointment by the Secretary of the Interior of an administrator at $10,000 a year to sell and encourage the widest possible use of surplus power generated at the dam.
2. Operating and maintenance by the army engineers of navigation and flood control features of the project and of power generation and delivery of power to a central switchboard.
3. Approval by the Federal Power Commission of electric rates fixed by the administrator, with discretion to revise them. The administrator would be required to reserve at least 50 per cent of the generated power until Jan. 1, 1941, for sale to public bodies.
4. Receipts from the sale of power to go into the Federal Treasury with a provision that $500,000 would be set up as a continuing fund for the administrator's program.

House bill provisional

The House bill is provisional pending establishment of a permanent administrator for all projects in the Columbia River Basin. It is planned that when power from Grand Coulee is ready for distribution all projects in the area will be guided by one authority.

•

Treasury Files Tax Claim Against Associated Gas

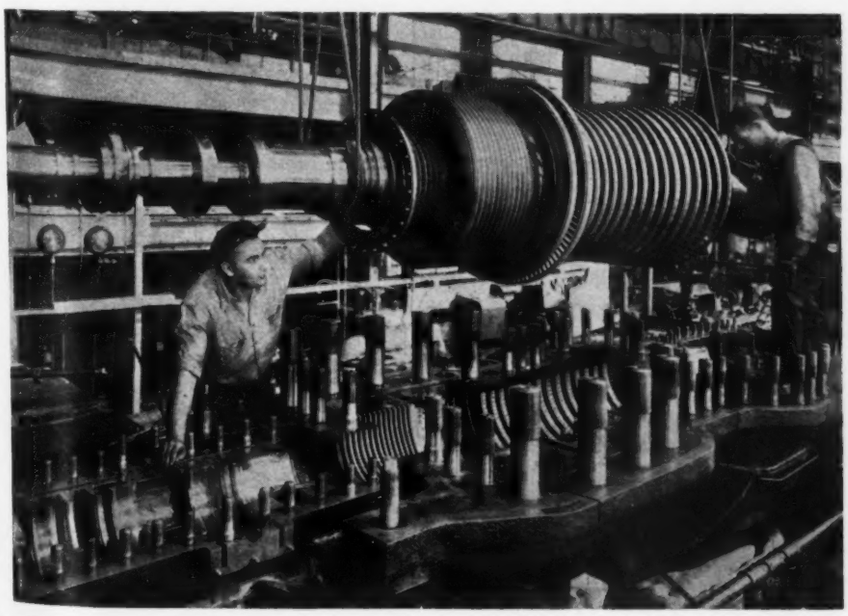
A tax claim for approximately $4,000,000 has been filed against Associated Gas & Electric Company by the Treasury, it was disclosed this week. The new claim brings the total pending assessments against the utility to $50,000,000. In January, 1936, the Treasury filed a $40,000,000 tax suit against the company. The latest move of the Treasury follows a re-examination of the books of Associated Gas & Electric and its 206 subsidiaries.

The suit is being directed by Morrison Shaforth, chief counsel of the Bureau of Internal Revenue. Opposing him in the legal contest is Charles M. Trammell, a former member of the Board of Tax Appeals, who is now associated with the utility system.

•

Westchester Utility Offers $25,000,000 Bond Issue

General mortgage bonds of the Westchester Lighting Company, 3½ per cent series, due 1967, to the amount of $25,000,000 have been offered the investing public. The bonds were priced at 102½ per cent and accrued interest. Proceeds will be applied toward the repayment of advances payable to Consolidated Edison Company.



NEW TURBINE—Lowering the rotor into the cylinder of the main 49,500-kw. Westinghouse Electric & Manufacturing Company turbine for Waterside station of Consolidated Edison of New York, Inc. Work is nearing completion in the South Philadelphia Works

Profit Sharing Made by General Electric

The semi-annual payment under the profit-sharing plan of General Electric Company for the first six months this year will be made August 2, Gerard Swope, president, stated. The amount of the general profit sharing available for the period is $2,253,730, as against $572,555 in the first six months last year.

It was stated that 57,800 employees will participate in the distribution this year, as against approximately 41,300 a year ago.

Mr. Swope stated that employees with five or more years of service will receive 4.8 per cent of earnings for the first six months under the plan. Those with three years, but less than five years, will receive 3.2 per cent of their earnings for the six months, and employees with from one to three years of service will receive 1.6 per cent.

•

Wagner Electric Joins CIO; to Lift Pay 4 Cents an Hour

A second proposal of the Wagner Electric Corporation to its employees has been accepted by some 1,500 members of the United Electrical and Radio Workers of America, CIO affiliate. It provides a wage increase of 4 cents an hour for straight-time production workers and 3 to 4 cents an hour for piecework.

A minimum wage of 32 cents an hour for beginners was established, together with a 35-cent minimum for employees of more than four months, with time-and-a-half for overtime. Employees will receive one week's vacation annually with pay amounting to 2 per cent of their earnings during the preceding year.

•

Birmingham Electric Reports Gain in Refrigerator Sales

Electric refrigerator sales in Birmingham, Ala., are 30 per cent ahead of last year, according to figures for all outlets compiled by the Birmingham Electric Company. A total of 6,129 units were sold during the first six months of this year, or 1,200 more than for the same period of 1936. Generally better business conditions in Birmingham are given chief credit for the sales increases.

Thirty-eight air-conditioning installations, totaling 1,656 hp., were made in Birmingham during the first six months this year, compared with 44 installations, totaling 594 hp., for the same period of 1936, according to Harold V. Fried, air-conditioning engineer for the company.

•

Power Unit Planned by Canadian Utility

Construction of a large power terminal and substation at Three Rivers, Quebec, at a cost of approximately $750,000, including necessary transmission line additions, is to be undertaken by the Shawinigan Water & Power Company.

The construction of this terminal, which will be one of the largest on the North American Continent, is a major step in a projected development of the Upper St. Maurice River which will eventually bring to the industrial areas of the Province over 1,000,000 hp. at present unharnessed on stretches of the river ranging from 110 to 175 miles north of Shawinigan Falls.

It was stated that the new terminal station will provide economies of operation and maximum efficiency in power distribution. It will also be the terminal for power reception from the northern plants.

The station will have an initial transformer capacity of 145,000 kva. Construction will be completed by the end of this year.

•

Court Exonerates Phillips

Supreme Court Justice Aaron J. Levy completely exonerated this week Ellis L. Phillips, president of the Long Island Lighting Company, and other officials and directors of wasting the corporation's assets and unjustly enriching themselves at its expense. The charges were made in a $20,000,000 accounting suit brought by minority stockholders.

Justice Levy declared that the most that could be said on the basis of the proof was that some errors of judgment were committed, mostly of a bookkeeping nature. He observed that the plaintiffs were few in number and held comparatively few shares of stock.

State Tax Board Sets Rules on Utility Levy

The New York State Tax Commission issued last week rules and regulations covering the enforcement of the new 2 per cent public utilities tax which was enacted by the last Legislature under Gov. Herbert H. Lehman's recommendation to raise $24,000,000 for unemployment relief.

The new tax measure, effective July 1, provides that in addition to the 2 per cent levy on gross income of utilities municipalities may enact a local 1 per cent tax, both receipts to be used for unemployment relief.

The commission clarified the term "gross income" to mean receipts from sales made and service rendered, profits from sale of securities, from the sale of real property, from the sale of personal property other than merchandise, receipts from interest, dividends and royalties and profits from any other transactions.

It was announced that representatives of various utility groups and city fiscal officers expressed general satisfaction with the rules and regulations following a conference.

•

Westinghouse Lamp Engineers Get Rewards for Inventions

The first monthly awards for inventions valuable to the electrical industry were received recently by four engineers at the Westinghouse Lamp Works, Bloomfield, N. J.

F. A. Newcombe, factory engineer, was presented with $200 by D. S. Youngholm, Westinghouse vice-president, for developing a machine to replace hand-dipping lamp bases in acid. Three years ago Mr. Newcombe and H. K. Richardson were rewarded for developing a platinum alloy die for glass furnaces.

The other awards, made by H. S. Black, manager of manufacturing and engineering, went to W. E. Carpenter for his indicator for automobile headlights and to T. R. Porter and W. L. Sullivan for a method of measuring ultra-violet radiations.

•

Seeks to Absorb Subsidiary

Application has been filed with the Federal Power Commission by the Pacific Power & Light Company for permission to absorb the Inland Power

& Light Company, a subsidiary. The consolidation will eliminate Pacific Power & Light as a holding company and simplify the corporate structure, Lewis A. McArthur, vice-president, told the commission.

•

Utah Power & Light Passes Sales Quota

Sales quota of the Utah Power & Light Company, in its annual program, will probably be realized early in September, as indicated in reports during the first six months. June attained quota by 118 per cent and brought in E.A.R. of $153,024, from all sources. The first six months has netted for the company $719,914, or 113 per cent of quota.

W. A. Huckins, sales manager, reports that residential sales activities accounted for $54,660, with major appliances sold as follows: 488 ranges, 1,653 refrigerators and 327 water heaters in June and 2,920 ranges, 6,179 refrigerators and 1,163 water heaters for the first six months this year.

Efforts of the commercial sales classification resulted in $31,768 E.A.R. in June and a total of $171,437 for the first six months.

Industrial sales have continued exceptionally good, it was reported, with $62,238 in June, or 207 per cent of quota, and an E.A.R. of $251,500, or 153 per cent of six months quota.

•

Adds 1,395 Rural Customers

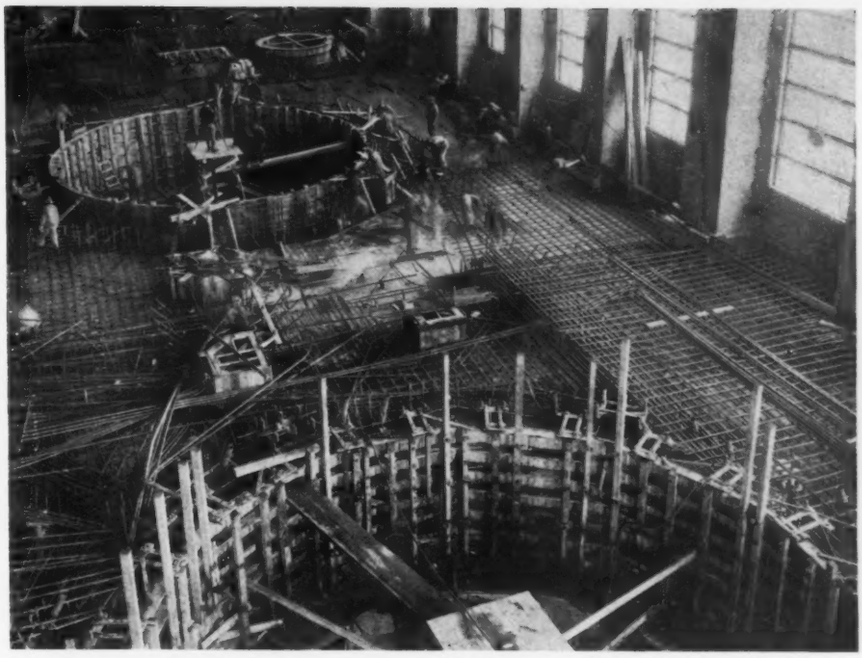
Georgia Power Company reports the addition of 1,395 new rural customers on 276.9 new miles of rural lines constructed during the first six months of this year. This mileage represents 44 per cent of the rural construction program scheduled for this year, 635 miles having been planned. Last year the company built 922 miles to serve 4,843 new customers.

•

Ross Suggests Inter-Tie of Seattle's Power Lines

An oral request by Superintendent of Seattle City Light J. D. Ross that he be permitted to draft a contract authorizing the construction of an inter-tie system between the power lines of City Light and those of the Puget Sound Power & Light Company has been granted by the city council.

In making the request Superintendent Ross stated that "we need the connection so that the two systems can exchange waste power to their mutual advantage. The move is purely an economic proposition."



BONNEVILLE DAM—Work on the giant turbine pits at the federal hydro-electric power project on the Columbia River is nearing completion. Concrete forms are being made for the house unit and unit No. 1 and for the power house floor

•

Joint Bids Made to Seattle for Ruby Dam Construction

The single joint bid submitted to the Seattle Board of Public Works for construction of Ruby Dam by General Construction Company, Seattle; J. F. Shea, Portland, and Columbia Construction Company, Bonneville, in sums of $3,967,785 is being considered by J. D. Ross and the City Light Engineering Department.

The following bids for 276,000 bbl. of cement were made: Superior Portland Cement, $1.88 in bulk for 275,000 bbl.; $2.38 in sacks for 1,000 bbl. Olympic Portland Cement Company bid $566,300 with price of $2.05 per barrel on bulk shipments and $2.55 on sack orders.

•

Mercoid Opens New Office

J. W. Owens, vice-president the Mercoid Corporation, Chicago, has announced the opening of a new office at 1035 Cathedral Street, Baltimore, Md., with John Jex, Jr., as manager.

Treasury Gets $1,200,000 Payments From Boulder Dam

June collections for Boulder Dam power totaled $150,000, bringing to a total payments of $1,200,000 which have been turned into the Treasury. Of that amount $900,000 was advance payment on equipment by Pasadena and Glendale, Calif.

The contract for firm power with Los Angeles did not begin until June 1, but $150,000 had been collected for secondary power before that date.

On July 10 the reservoir contained 15,250,000 acre-feet of water. It is estimated that two more years will be required for the maximum of 30,500,000 acre-feet to accumulate. In June the plant produced 81,536,000 kw.-hr. of electricity.

•

Grand River Plan Presented

Representative Wesley Disney, Tulsa, has presented to President Roosevelt a brief explaining details of a proposed $15,000,000 Grand River dam hydroelectric project in northeastern Oklahoma. The President had ordered the survey made (ELECTRICAL WORLD, July 25, 1936, page 9). State Senator Jack Rorschach, Vinita, stated that the full $15,000,000 would not now be asked, but only $4,800,000 to start the work and carry it on for two years.

Water Heating Award Attracts 38 Utilities

Thirty-eight utility companies from all sections of the country have registered in the competition for the award of $1,000 and a silver trophy offered by the National Electric Water Heating Council through the Edison Electric Institute, it was announced last week by C. E. Greenwood, commercial director of the Institute. Registrations closed July 1. The winner of the award will be announced at the annual convention of the Institute next year.

Mr. Greenwood stated that the entries represented approximately 30 per cent of the 120 utility companies in the country that offer water heating rates of 1¼ cents or less.

The award will be given to the utility company whose work and co-operative efforts show the greatest contribution to the development of the domestic water heating load through planning promotion or selling, or both, during 1937, Mr. Greenwood stated.

It was stated that the award is on a different basis from other honorary awards in that both large and small utility companies may enter with equal opportunity to win. Major consideration will be given to the utility company whose water heating plan is most original and whose execution of the plan is most effective, Mr. Greenwood stated.

•

Store Front Exhibit Held

Commonwealth Edison Company exhibited at its downtown electric shops, 72 West Adams Street, Chicago, July 28-31, a display of twelve model store exteriors. These miniature store fronts embody the latest developments in design, construction and illumination as applied to the modernization of various types of retail stores. The display is on a nation-wide tour and has attracted widespread interest wherever it has been shown.

•

"The Home of Ideas" in Utah

The modern electric home sponsored by the Utah Power & Light Company, called "The Home of Ideas," was opened officially last month. This house demonstrates in an actual home setting the many modern domestic applications of electricity. More than 5,000 persons had visited the home by early May.

•

Hold Sales Meeting

Hotpoint sales executives and sales representatives of the central northwest district recently held a district meeting at Chapel Hill Resort on Sand Lake, Minn. H. K. DeWees, district manager, presided.

Meetings

International Association of Electrical Inspectors — Joint annual meeting, northwestern and southwestern sections, Hotel Utah, Salt Lake City, August 23-26, F. D. Weber, secretary-treasurer, northwestern section, P.O. Box 70, Portland, Ore. H. L. Gerber, secretary-treasurer, southwestern section, 914 Merchants Exchange Building, San Francisco, Cal. Eastern section, Hartford, Conn., September 27-30, Joseph P. Rohan, general chairman, Hartford Building Department, Hartford, Conn.

American Institute of Electrical Engineers—Pacific Coast convention. Spokane, Wash., August 30-September 3. Middle Eastern District, Akron, Ohio, October 13-15. H. H. Henline, national secretary, 33 West 39th St., New York, N. Y.

National Association of Railroad and Utilities Commissioners—Annual convention, Salt Lake City, August 31-September 3. Clyde S. Bailey, secretary, Earle Building, Washington, D.C.

Pennsylvania Electric Association—Annual convention, Bedford Springs Hotel, Bedford, Pa., September 8-10. Harold A. Buch, secretary-treasurer, Telegraph Building, Harrisburg, Pa.

Wisconsin Utilities Association—Transportation section convention, Lawsonia Hotel, Green Lake, Wis., September 13 and 14. Accounting section convention, same place, September 24 and 25. A. F. Herwig, executive secretary, 135 West Wells St., Milwaukee.

American Transit Association — Annual convention, White Sulphur Springs, West Va., September 19-23.

Illuminating Engineering Society—Annual convention. Greenbrier Hotel, White Sulphur Springs, W. Va., September 27-30. A. D. Cameron, general secretary, 51 Madison Avenue, New York, N. Y.

Iron and Steel Exposition—Sponsored by the Association of Iron and Steel Engineers, Stevens Hotel, Chicago, Ill., September 28-October 1. Brent Wiley, managing director, Empire Building, Pittsburgh, Pa.

Chicago Exposition of Power and Mechanical Engineering — International Amphitheatre, Chicago, Ill., October 4-9.

International Association of Electrical Leagues—Annual convention, New York, N.Y., October 6 and 7. O. C. Small, secretary, 155 East 44th St., New York.

Electrochemical Society — Fall meeting, St. Louis, Mo., October 13-16. Colin G. Fink, secretary, Columbia University, New York, N. Y.

American Welding Society—Annual meeting and welding exposition. Atlantic City, N. J., October 18-22. Warner S. Hays, managing director, 29 West 39th St., New York, N. Y.

Indiana Electric Association — Annual meeting, French Lick Springs, Ind., October 21-23.

Stockholm Observes Electricity Week

Leading Swedish electrical engineers recently met in Stockholm to study the problems of the electrical industry. Chief among these is the question of transmitting to southern Sweden the energy produced in the rich water-power resources of the far north. Already a power line of nearly 1,000 km. (621 miles) is under construction, one of the world's longest. It will reach from the new power station at Kröngede in northern Sweden to Malmö in the extreme south.

Edy Volander, secretary of the Swedish Society for the National Employment of Electricity, which organized the meeting, forecasts that it will not be so very long before the big Lapland rivers will furnish energy to southern Sweden, 930 miles away.

Much has been done to encourage the small as well as the big user of energy and an active campaign is carried on to extend the uses of electricity. A specially equipped bus is touring the country, showing the latest electrical devices in practical use.

•

Kentucky Utility Commission Adopts New Accounts System

The Kentucky Public Service Commission has adopted for major electric utilities under its jurisdiction a new accounting system embodying, with minor modifications, accounting principles incorporated in the uniform system recently prescribed by the Federal Power Commission.

The commission stated that the main feature is the requirement that utilities restate their property investment accounts on the basis of original cost, which is interpreted as cost of plant and equipment at the time of dedication to public service. The system becomes effective January 1, 1938.

•

Cooking School Ends Tour

The 1937 cooking school arranged by the home service department of the Potomac Edison Company recently closed, after having completed a tour of six cities before a total audience of about 1,200.

Output 7.6 per Cent Over 1936

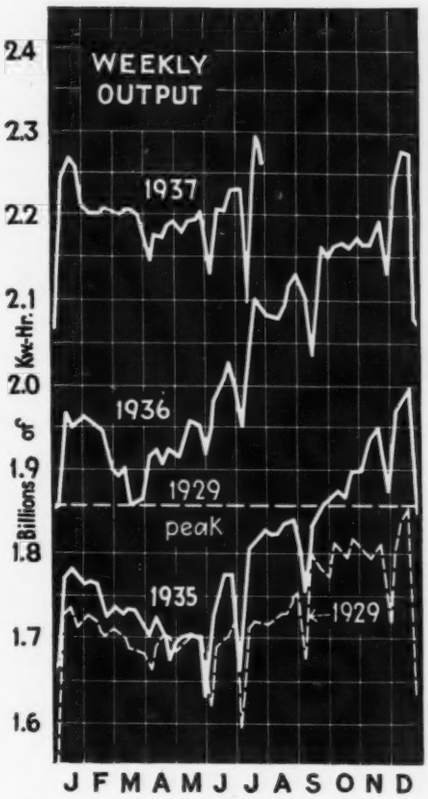
Power production drops from record peak set last week — Rising trend continues

Following the exceptional rise in the preceding week the output of energy by the electric light and power industry declined somewhat in the week ended July 24 to 2,258,776,000 kw.-hr., according to the Edison Electric Institute. Despite the recession the upward trend that started in April continues to be evident. The gain over the like period a year ago was 7.6 per cent. The rate has varied considerably from week to week, but the average for June and July is about 11 per cent.

Regional changes have been somewhat irregular, but in general the gain over 1936 has been largest in the Rocky Mountain states and smallest in the West Central, with lagging recovery in the Central industrial area.

Per Cent Change from Previous Year

Region	Week Ending July 24	July 17	July 10
New England	+ 8.5	+ 5.8	+ 1.5
Middle Atlantic	+ 7.4	+10.0	+ 5.8
Central Industrial	+ 9.8	+12.9	+ 8.3
West Central	+ 1.9	+ 2.3	+ 0.7
Southern States	+12.1	+10.7	+10.0
Rocky Mountain	+15.2	+19.1	+22.2
Pacific	+ 7.0	+ 9.3	+ 7.8
United States	+ 7.6	+13.2	+ 7.2



Weekly Output, Millions of Kw.-Hr.

1937	1936	1935
July 24...2,259	July 18..2,100	July 20..1,807
July 17...2,298	July 11..2,030	July 13..1,766
July 10...2,096	July 4..1,956	July 6..1,655
July 3...2,238	June 27..2,030	June 29..1,772
June 26...2,238	June 20..2,005	June 22..1,775
June 19...2,214	June 13..1,990	June 15..1,743
June 12...2,214	June 6..1,945	June 8..1,724

Wiring Design Handbook Now in Fifth Printing

With a distribution of 30,000 reported for the last few months, a fifth printing has been required for the "Handbook of Interior Wiring Design," according to the Edison Electric Institute.

The handbook was prepared by a joint committee representing electrical utilities and electrical construction interests. The need of adequacy in copper and in numbers of wiring outlets to meet growing needs for electrical equipment is given as the reason for the demand for the books.

•

New Russian Power Plant

Construction of a new 100,000-kw. steam-operated power station for Russia has been started on the shore of the Sea of Azov near Mariupol. The first 25,000-kw. unit of the plant, which will supply power to the Azovstall Iron and Steel Works and other industries in the Mariupol area, is expected to be ready for operation some time next year.

•

F.P.C. Sets Hearing Date

The Federal Power Commission will hold a hearing on September 27 on the petition of the Portland General Electric Company asking rehearing on the report of the commission which denied an application by the utility for amendment of license of its Oak Grove project.

•

Argentina Output Higher

Production of electric energy in Argentina showed an increase of 7.4 per cent in 1936 over the previous year, according to the Bureau of Foreign and Domestic Commerce. Installed capacity showed an increase of only 0.2 per cent in the same period. Total power output was 1,589,500,000 kw.-hr.

•

British Power Production Shows Increase in June

Electricity generated by authorized undertakers in Great Britain during June totaled 1,575,000,000 kw.-hr., according to reports to the Electricity Commissioners. This compares with revised 1,334,000,000 kw.-hr. in the same month last year, an increase of 18.1 per cent.

During the first six months of this year total energy generated was 11,222,000,000 kw.-hr., as against revised 9,892,000,000 kw.-hr. in the same 1936 period, a gain of 13.4 per cent.

•

Union Wire Buys New Unit

Union Wire Die Company, Stamford, Conn., has been acquired by the Carboloy Company, Inc., Detroit, Mich., a General Electric Company subsidiary. The sale became final July 15 and includes manufacturing, sale, distribution and servicing units. The Stamford plant will be continued and enlarged at some future date.

•

Canada Reports May Output

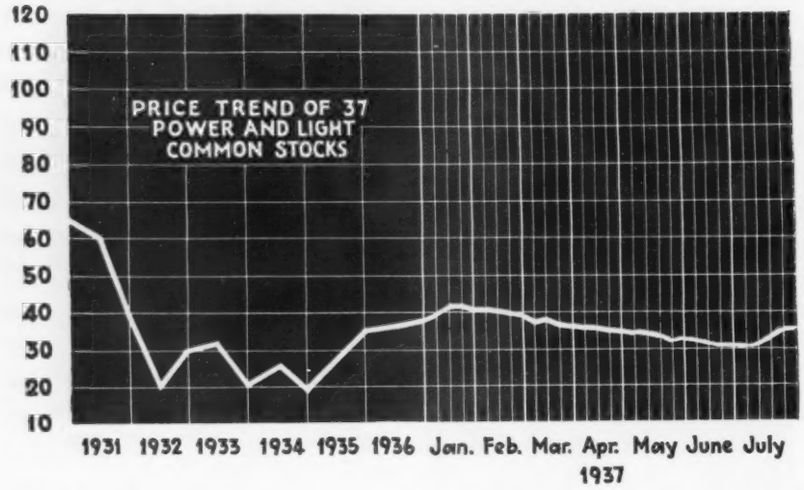
Central stations in Canada produced 2,301,167,000 kw.-hr. during May, as compared with 2,322,884,000 in April and 2,083,363,000 during May last year. Exports to the United States in May amounted to 161,027,000 kw.-hr.

Fourteen-Year Index

Discovery of a small supply of copies of the composite index to "Electrical World" for the years 1883 to 1896, long out of print, makes it possible to offer them at a nominal price of $1, to cover handling and shipping costs.

Covering an early period of extraordinary development, ranging from the beginnings of central station d.c. supply to the introduction of a.c. and of three-phase systems, this index, a book of 372 pages, should enormously facilitate researches in the history of the electrical industry, including those relating to patents.

Utility Stock Rise Continues



Apparently reflecting the output record set last week, utility stocks continued their gains, the "Electrical World" index rising to 34.7, higher than it has been since the week of April 17. Index previous week, 33.7; year ago, 40.0; 1937 high, 41.5; low, 30.6

Rochester Gas Plans $3,000,000 of Bonds

Stockholders of Rochester Gas & Electric Corporation voted at their adjourned annual meeting last week to amend the company's charter to permit it to extend its territory of operation and to increase the preferred stock to 500,000 shares from 300,000 shares.

The utility plans to float a $3,000,000 bond issue in the near future, Ernest C. Scobell, vice-president, stated. The funds will be raised for the $4,000,000 expansion program adopted for this year.

The company is a subsidiary of NY PA NJ Utilities Company, a subsidiary of Associated Gas & Electric Company.

•

Tennessee Electric Power Plans $4,960,000 of Bonds

Tennessee Electric Power Company, subsidiary of Commonwealth & Southern Corporation, has applied to the Federal Power Commission for permission to issue $4,960,000 principal amount of its first and refunding mortgage bonds, 5 per cent series, due June 1, 1956. Proceeds are to be used to reimburse the treasury for $4,208,500 of unfunded capital expenditures and $751,500 previously used to retire a like amount of underlying bonds.

The parent company is to purchase $1,000,000 at 90 and accrued interest and the remainder at a price not less than three points below the market price prevailing for small lots at the time of delivery, or 90, whichever is the greater.

•

International Stock Acquisition Allowed

Application of the International Hydro-Electric System for the acquisition by it of 1,439,020 common shares of Gatineau Power Company has been approved by the Securities and Exchange Commission.

Among the recent statements filed with the commission are the following:

Arkansas-Missouri Power Corporation has filed a notification of registration as a holding company. The registrant has recently been organized under order of the U.S. District Court for the northern district of Illinois, eastern division, in proceedings for reorganization of Arkansas-Missouri Power Company.

Citizens Utility Company of Minneapolis, Minn., has filed an application with SEC for approval of the acquisition of all the assets and business of Newport Electric Corporation, Newport, Vt., a wholly owned subsidiary of the applicant, operating in the northern part of Vermont, with distribution lines extending into a small portion of the province of Quebec.

•

Utilities Pay Huge Taxes

The West Virginia business, occupation and professional tax, sometimes called the "gross sales tax," for the year ended June 30, 1937, netted the state $13,067,461, according to a statement recently released by the State Tax Commissioner. The recapitulation showed that $4,227,129 was collected from the utilities.

Light, power and natural gas utilities contributed $1,486,265 of this sum, the largest amount paid by any class of utility with the exception of the steam railroads.

•

Consolidated Edison Extends Stock Offer

Consolidated Edison Company of New York, Inc., last week formally notified preferred-stockholders of New York Steam Corporation of its offer to exchange 91,701 shares of its $5 preferred stock for the outstanding $7 and $6 preferred shares of New York Steam.

Consolidated Edison proposes to exchange one share of its $5 preferred for one share of $7 Steam preferred and nine-tenths of a share of its $5 preferred for one share of $6 Steam preferred.

Holders of at least two-thirds of Steam preferred must accept the offer on or before September 1 for it to become effective. Provision has been made to extend the effective date to not later than December 1, 1937.

•

Utility Unit Dissolved

New York Clearing Corporation, a unit of the Associated Gas & Electric System has been dissolved, bringing to 347 the total of system companies which have been merged, dissolved or otherwise eliminated.

Earnings Reports (Utilities)

	Net Income 1937	1936
*Duquesne Light	$10,601,556	$10,611,486
‖†Ass'd G.&E. and subs.	35,867,594	31,679,750
†Pub. Serv. N.J. and subs.	25,377,500	23,020,115
*Wis. Pub. Serv. and sub.	1,433,520	839,508
†Montana Power and subs.	3,972,755	2,808,910
†Texas Electric Service	1,454,672	1,150,689
†Wash. Water Power and subs.	2,682,159	2,695,088
†Florida Pwr. & Light	1,653,492	886,575
†Kansas Gas & Electric	1,319,180	1,084,060
†Minnesota Pwr. & Lt.	1,299,272	1,241,740
†Texas Pwr. & Lt.	1,985,893	2,097,708
‡Shawinigan Water & Power	2,202,962	1,647,631

* Twelve months ended May 31.
† Twelve months ended June 30.
‖ Operating income, preliminary.
‡ Six months ended June 30, before depreciation and income taxes.

Building Load With LIGHT

LIGHT—the original load—the load that for years was the largest revenue producer for the electric utility industry, is once more coming to have a major place in load-building operations. There is nothing spectacular about the sale of a lamp or even a thousand lamps. The actual merchandise sale is not great, nor is the wattage per unit sold large. Nevertheless, light is the universal load. Every customer uses light—can use more light. Light enjoys a wider market than any other application of electrical energy, and though the unit of sale be small the aggregate is large.

New conceptions of light utilization have revolutionized selling. Better Light-Better Sight, with its gospel of light for vision, so altered our idea of what was adequate illumination that almost overnight the lighting of virtually every customer became insufficient. Higher wattage lamps, more of them, longer hours of burning became the order of the day. The result, of course, is increased load.

Backing up the selling of the utilities is the promotional effort of the lighting industry, the co-operation of eye specialists and sight-saving councils. In other words, it is easier to sell more light and better light today than ever before because there are more people urging its use.

Furthermore, there are more tools for selling light than we ever had before. The sightmeter, visibility meter, lighting kits and sales-training courses have been evolved to help utility people develop the lighting load.

New uses for lighting, particularly in business; new units to produce greater illumination without glare or excessive brightness; new studies on industrial application of light, with the design of specialized light sources to fit particular seeing jobs; higher intensity illuminants; new highway lighting technique—these are contributing to a larger opportunity for load building.

Stores are turning to light as an important factor in building trade, schools see better lighting as an aid to better education, factories are finding that light improves industrial relations, communities are using highway lighting to reduce night-driving accidents.

An evaluation of the load and revenue possibilities of lighting —the universal load builder—is presented in the following pages. Not every angle of lighting could be touched on. Those that are, however, we hope will stimulate the utility industry to even greater efforts in cultivating the apparently limitless market for building profitable load with light.

25,600,000,000 KW.-HR.

To Burn Out 1936 Lamp Production

LAST YEAR 462,000,000 large Mazda lamps were sold. Taking the factors of size and hours of life it has been calculated that it will take 25,600,000,000 kw.-hr. to burn them out.

To appreciate how large lighting looms in the load-building picture, one needs only to realize that the total amount of energy sold last year to ultimate consumers was not quite 90,000,000,000 kw.-hr.

The sale of incandescent lamps passed the 1929 peak some time ago and is continuing to climb. The estimate of half-a-billion lamps this year is very conservative. This is particularly true when one considers the longer hours of night operation in factories that are crowded with orders.

The yearly totals shown in the opposite column are for large lamps only. They do not include miniature lamps or street lamps.

Not only is the output of incandescent lamps growing, but the size of lamps is getting larger. In 1926 10.8 per cent of the output was in the 100- and 150-watt sizes. Last year these sizes took 12.1 per cent of the output. When it is remembered that the 1936 output was considerably greater than the output ten years previously, this figure becomes even more significant.

The increasing sale of these larger sizes has had the effect of steadily increasing the average wattage of the large lamp output. From 58.2 watts in 1933 the average has gone to 61 per cent in 1936. Had it not been for the introduction of the new 7½-watt night light lamp, which has sold in large numbers, the average wattage in 1936 would have shown a greater increase.

The increased wattage per lamp in 1936 over 1935 was only six-tenths of a watt, yet spread over the entire output this alone meant a connected load gain of 277,200 kw. Translated into energy consumption during the burning life of the lamp, this small increase in wattage means 244,700,000 additional kilowatt-hours.

Or if the comparison is made between 1936 and 1933, the increase in average wattage of 2.8 watts resulted in 1,293,000 additional kilowatts, or 1,180,000,000 additional kilowatt-hours.

Three-filament lamps

The effect of the I.E.S. lamp upon three-filament lamp sales has been to go from no production in 1933 to 1,366,200 last year. These lamps are used almost exclusively on I.E.S. lamps and their increasing volume is playing a part in raising the average wattage. It will be noticed that 75 per cent of these lamps last year were in the 100-, 200-, 300-watt size.

To load builders the real significant figures are not how many lamps were made, but what do they represent in load. The figures show a growth from less than 20,000,000 kw. in 1932 to more than 30,000,000 kw. in 1936. This, translated into energy required to burn out these lamps, shows a growth from 18,000,000,000 kw.-hr. in 1933 to 25,600,000,000 kw.-hr. last year.

These are the cold statistics of load building with light, for the lighting load is but the use of lamps. The figures indicate not only larger sales each year in numbers, but in average wattage as well. This means an even faster increase in connected load.

LARGE MAZDA LAMP SALES

Year	Number
1932	334,600,000
1933	339,400,000
1934	380,000,000
1935	413,000,000
1936	462,000,000
1937*	500,000,000

*Estimated.

Note—Exclusive of miniature and street lamps.

TREND OF 100- AND 150-WATT LAMPS

1926	10.8% of total sales
1936	12.1% of total sales

THREE-FILAMENT LAMP SALES

Year	Number
1933	0
1934	151,000
1935	473,000
1936	1,366,200

Note—These lamps are used almost exclusively on I.E.S. lamps.

1936 Sales

50 — 100 — 150 watt	282,700
100 — 200 — 300 watt	1,032,000
150 — 200 — 350 watt	24,000
200 — 300 — 500 watt	27,000
400 — 600 — 1000 watt	500
	1,366,200

Note—Over 75 per cent of these lamps are in the 100-, 200-, 300-watt sizes.

AVERAGE WATTAGE INCANDESCENT LAMPS

1932	59.0 watts
1933	58.2 watts
1934	58.7 watts
1935	60.4 watts
1936	61.0 watts

Increased wattage per lamp in 1936 over 1935 represented 277,200 kw. or 244,700,000 kw.-hr. additional energy during burning life of lamps.

Increased wattage per lamp in 1936 over 1933 represented 1,293,000 kw. or 1,180,000,000 kw.-hr. additional energy during burning life of lamps.

LAMP SALES IN KILOWATTS

Year	Kw.
1932	19,753,000
1933	19,783,000
1934	22,300,000
1935	24,900,000
1936	30,500,000

ENERGY REQUIRED TO BURN OUT LAMPS SOLD EACH YEAR

Year	Billions of Kw.-Hr.
1933	18.1
1934	20.0
1935	22.7
1936	25.6

I.E.S. LAMPS

Build Load Rapidly

LESS than four years ago the I.E.S. lamp was not in existence. Through June this year 2,378,000 tags have been issued by the Electrical Testing Laboratories.

According to one of the leading authorities, the 100-watt I.E.S. lamp consumes from 40 to 70 kw.-hr. per year, while the three-lite I.E.S. lamp consumes from 100 to 145 kw.-hr. per year. The I.E.S. lamps in use up to the first of this year were estimated to be adding 150,000,000 kw.-hr. to the central-station load.

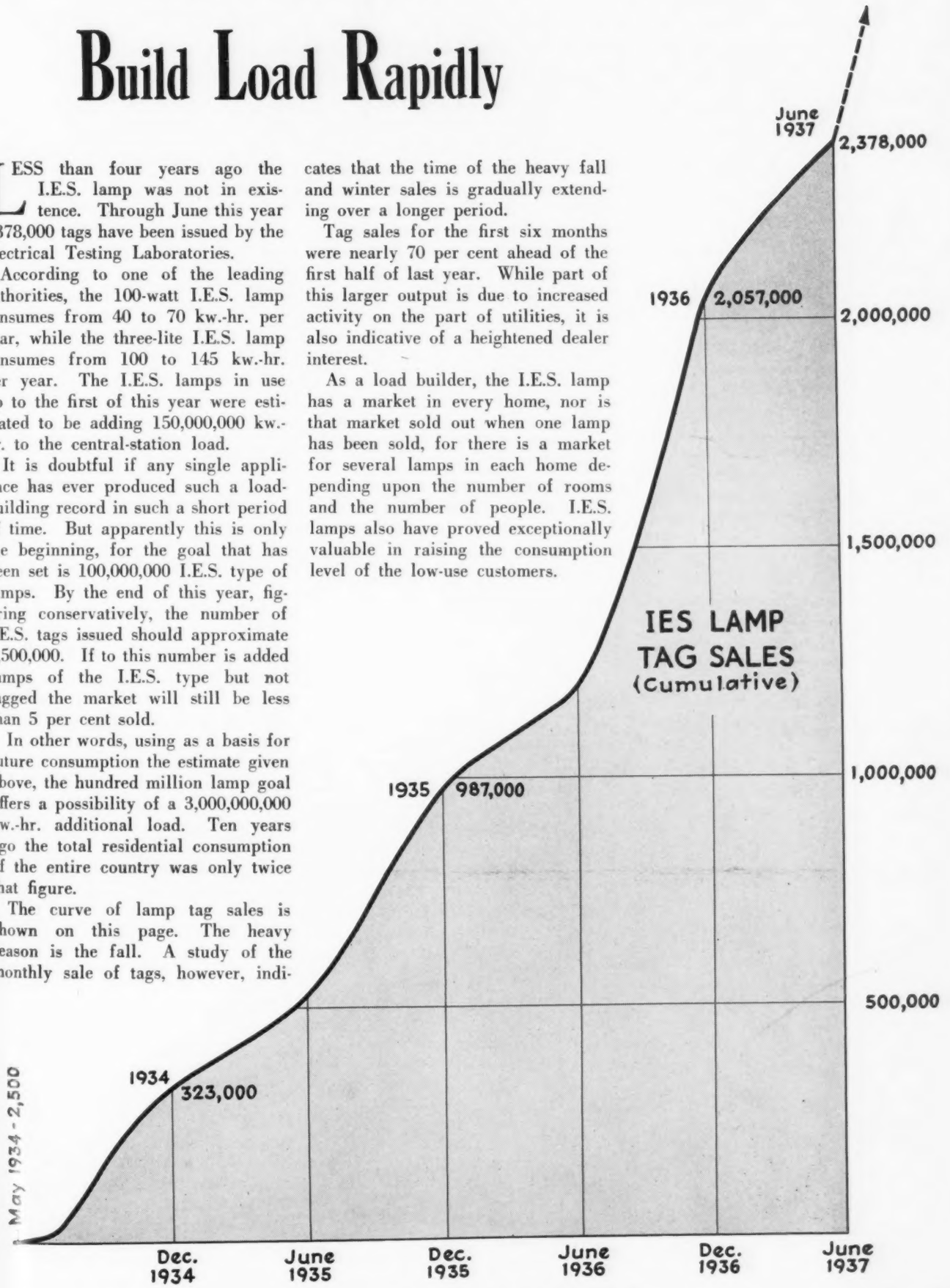
It is doubtful if any single appliance has ever produced such a load-building record in such a short period of time. But apparently this is only the beginning, for the goal that has been set is 100,000,000 I.E.S. type of lamps. By the end of this year, figuring conservatively, the number of I.E.S. tags issued should approximate 3,500,000. If to this number is added lamps of the I.E.S. type but not tagged the market will still be less than 5 per cent sold.

In other words, using as a basis for future consumption the estimate given above, the hundred million lamp goal offers a possibility of a 3,000,000,000 kw.-hr. additional load. Ten years ago the total residential consumption of the entire country was only twice that figure.

The curve of lamp tag sales is shown on this page. The heavy season is the fall. A study of the monthly sale of tags, however, indicates that the time of the heavy fall and winter sales is gradually extending over a longer period.

Tag sales for the first six months were nearly 70 per cent ahead of the first half of last year. While part of this larger output is due to increased activity on the part of utilities, it is also indicative of a heightened dealer interest.

As a load builder, the I.E.S. lamp has a market in every home, nor is that market sold out when one lamp has been sold, for there is a market for several lamps in each home depending upon the number of rooms and the number of people. I.E.S. lamps also have proved exceptionally valuable in raising the consumption level of the low-use customers.



1936 Utility Lamp Activities

A SURVEY of 226 companies was made to ascertain the portable lamp sales and empty socket campaign activities of utilities in 1936. From the tabulated results which appear below some interesting facts can be gathered.

The total output of I.E.S. lamps last year on the basis of the number of tags issued was 1,070,000. One hundred and thirty-seven utilities sold 486,860 I.E.S. lamps.

Only about half of the companies reporting engaged in an empty socket campaign, although 78 companies from which reports were received added 561,300 kw. connected load, an average of 7,200 kw. per company, by filling empty sockets.

With an average of 1.54 lamps sold per meter in empty socket campaigns at an average wattage of 61 watts, which incidentally was the average of all large lamps manufactured last year, the average wattage added per meter in such campaigns was close to 100 watts.

While only 48 companies reported any activity in kitchen lighting units, the average per company of 1351 is indicative of a load-building opportunity that might be given more consideration.

Pin-it-up lamp sales show an average from reporting companies of 751 lamps per company. If these lamps all used 100-watt bulbs, the average was 75 kw. per company.

In all lamp activities, the companies relied heavily on their own employees. Only 20 per cent of those reporting conducted portable lamp sales through dealers and less than 15 per cent conducted empty socket campaigns through dealers. Sales crews were not used either to any considerable extent in selling portable lamps, the percentage being only 11 per cent.

From these figures, it is apparent that the companies are relying very largely on lighting advisers to develop such lighting sales. Some data on the extent to which they are employed was secured in the same survey.

Full-time home lighting advisers to the number of 1,148 were reported by 114 companies and 510 part-time advisers by 46 companies. The number of supervisors totaled 185, reported by 89 companies. If averages were taken of these figures, it would show ten full-time advisers per company and two supervisors. The ratio of supervisors to advisers would be lower if some account could be taken of the part-time girls.

Full-time representatives doing the same kind of work on industrial and commercial lighting as the girls are doing for home lighting numbered 1,188 for 115 companies, 505 part-time representatives for 58 companies and 186 supervisors for 95 companies—again about ten full-time representatives per company and two supervisors.

To close this statistical analysis of 1936 utility lamp activities, the following figures are given for the mythical average company. They may serve as a basis for checking for some companies and perhaps as an inspiration for others.

	Average per Utility
Number of I.E.S. lamps sold	3,554
Number of pin-it-up lamps sold	751
Number of kitchen units sold	1,351
Number of lamps sold in empty socket campaigns	118,000
Wattage added in empty socket campaigns	7,200

1936 EMPTY SOCKET CAMPAIGN

(226 Companies)

Was campaign conducted through employees?	Yes	92
	No	119
	No information	15
Was campaign conducted through dealers?	Yes	31
	No	177
	No information	18
Was campaign conducted through others?	Yes	9
	No	199
	No information	18
Number of lamps sold per meter (75 companies)		1.54
Average watts per lamp (69 companies)		61.01
Average watts per meter		93.95
Number of lamps sold (78 companies)		9,200,000
Total wattage of lamps sold (78 companies)		561,300 kw.-hr.

PORTABLE LAMP SALES

(226 Companies)

Were sales conducted through employees?	Yes	108
	No	89
	No information	29
Were sales conducted through dealers?	Yes	38
	No	151
	No information	37
Were sales conducted through sales crews?	Yes	21
	No	168
	No information	37
Number of I.E.S. lamps sold (137 companies)		486,860
Number of pin-it-up lamps sold (79 companies)		59,372
Number of kitchen units sold (48 companies)		64,856

LIGHTING ACTIVITIES when well organized and planned can add a substantial amount of annual revenue at a low cost per dollar E.A.R. Below are a few case studies embracing 1936 operations. These studies represent different sections of the country covering some large but mostly small communities. They include both day-by-day selling and short-period employee campaigns. In no case, however, has anything been included that was pretentious.

Case Studies

1. A study of the results of the first six months' efforts of home lighting advisers, irrespective of the time each started, shows the number of demonstrations to average between 40 and 50 per adviser per month, the recommended kilowatts to rise from around 15 to between 25 and 30 kw. per adviser per month, and the actual increase in connected load to have risen to between 10 and 12 kw. After the first six months the recommendation per demonstration held fairly constant at around 550 watts, with the actual installation, as shown by jobs checked, more than 300 and in some cases more than 400 watts. The monthly load sold per adviser averaged between 8 and 12 kw. and is gradually increasing. The cost per adviser per month, including all direct costs of the home-lighting activity but exclusive of general overhead, is now less than $140.

2. In a burned-out lamp renewal activity the average order was 455 watts. Number of orders for lamp renewals was 155,492, totaling 1,245,595 lamps. The increase in lamp sizes amounted to 1,576 kw. with an E.A.R. of $47,280. In addition, this activity brought 1,880 leads for home service demonstration, more than a thousand merchandise leads and more than two thousand appliance repair tickets.

3. The sale of 520 commercial lighting fixtures ranging from 200 to 750 watts, 48 exterior floodlights ranging from 250 to 1,500 watts, together with equipment for window case and local lighting, resulted in 337 kw. load with an E.A.R. of $16,880 at a cost of 43 cents per dollar of E.A.R. Without crediting profits on lamps and bulbs, the cost of securing 507 kw. additional residential lighting load with an E.A.R. of $15,210 was 33 cents per dollar E.A.R.

4. A mill town with a larger than usual percentage of unprofitable users put on a 100-watt pin-it-up lamp campaign. Employees were offered a 25 cent commission per lamp sold, with the understanding that they did not have to sell the lamps if they did not want to. Campaign was planned to last two weeks and 2,500 lamps ordered. Actually sold, 6,000 lamps. One meter-man sold 278 units. Total gain in lighting load 600 kw.

5.

Number of home lighting advisers	8
Number of demonstrations per adviser day	1.8
Number of demonstrations—total	3,701
Kilowatts installed	1,531
E.A.R.	$45,450

6. More than 12,000 pin it-up lamps and more than 2,000 I.E.S. lamps sold by employees. The total connected load was more than 1,700 kw. and the cost per dollar E.A.R. 28 cents. An analysis of the sales of pin-it-up lamps revealed the following: Homes paying top rate for current consumed by lamp, 12.6 per cent; those paying second step, 28.1 per cent; those paying third step, 22.9 per cent, and those paying low step, 36.4 per cent. An analysis of accounts of customers using less than 50 kw.-hr. per month showed pin-it-up lamps brought about an average increase of 52.9 kw.-hr. per year, or a revenue increase of $2.96 per year.

7. Results from a crew of one crew manager, three lighting supervisors and three lighting salesmen operating in seven cities ranging in size from 340 to 4,538 residential customers and totaling 17,669 residential meters:

Total lighting unit sales		5,887
3-lite lamps	1,313	
Portable lamps	1,070	
Pin-it-up lamps	1,592	
Kitchen units	628	
Miscellaneous lighting units	1,284	
Total wattage connected		888 kw.
Total E.A.R.		$26,601
Net cost per dollar E.A.R.		35 cents

8. A campaign directed at 444 gasoline-filling stations starting in June resulted in seven months in 86 installations with a total of 102 kw., consuming 101,764 kw.-hr., with an estimated annual revenue of $6,139.57. A check on a number of these accounts showed the actual revenue to be 46 per cent in excess of the estimated revenue.

RESULTS

COSTS		
13,134 I.E.S. table lamps	$20,095.02	
2,071 I.E.S. floor lamps	4,173.07	
5,636 I.E.S. general purpose	15,780.80	
	$40,048.89	
S.F. & H. 10 per cent	4,004.89	
Total cost Mazda lamps	4,860.00	
Total cost of I.E.S. lamps delivered		$48,913.78
Merchandise Resale Value:		
13,134 table studies	$25,611.30	
2,071 floor studies	8,180.45	
5,636 general purpose	27,898.20	
Total merchandise resale value		$61,689.95
SELLING COSTS		
Sales promotion	$7,206.16	
Salaries	5,250.00	
Commissions	12,029.50	
Prizes	460.00	
Miscellaneous	750.00	
Total cost of activity		$25,695.66
GROSS MERCHANDISE PROFIT		$12,776.17
Net cost of activity		$12,919.49
E.A.R. added	$70,977.00	
Gross cost per dollar E.A.R.	$0.362	
Net cost per dollar E.A.R.	$0.182	

TEN REASONS FOR BUILDING

Home Lighting Market

By J. H. Fiester
Kentucky Utilities Company

HOME lighting has possibilities far beyond that realized by the average utility man today. The average annual additional use of 200, 300 or 500 kw.-hr. per home for at least half of our customers in lighting alone is not impossible of attainment if all customer benefits are thoroughly appreciated by him.

Some of the reasons for this feeling and which have an important bearing on our decision to concentrate on this market are as follows:

1. Due to our large industrial load, which accounts for approximately one-third of our gross electric revenue, it is quite evident that a greater diversity of sources of revenue is an absolute necessity. This is especially true since the largest part of our industrial business revenues comes from the coal mining industry.

2. Unlike the range and water heating business, additional investment in distribution facilities for home lighting is not immediately necessary.

3. The desirability of reducing average rates is, of course, obvious to all. This cannot be accomplished to the greatest extent without consideration of the large percentage of our customers who cannot be considered as immediate prospects for ranges or water heaters.

4. Nearly 50 per cent of our residential and farm customers use an average of less than 20 kw.-hr. per month. Home lighting affords us the best opportunity to raise these customers into a more profitable group.

5. Much of the home lighting business is secured in the higher steps of the rate, therefore it should have a beneficial effect on the company's earnings.

6. With the figure 70,000, which represents the total number of residential and farm customers, to use as a multiplier, it is evident that a large volume of potential new business is available even though the increments of load are small.

7. From the viewpoint of sales and sales promotion assistance from outside agencies, there is no other electric service that approaches home lighting in this respect.

8. New developments in sales tools simplify the job of selling home lighting. I refer particularly to the sightmeter and the various demonstration kits and sales courses.

9. From the viewpoint of customer relations, probably no service, if properly presented and sold, offers so much as home lighting.

10. The apparent effect of home lighting on the system load curve indicates that this class of business is profitable.

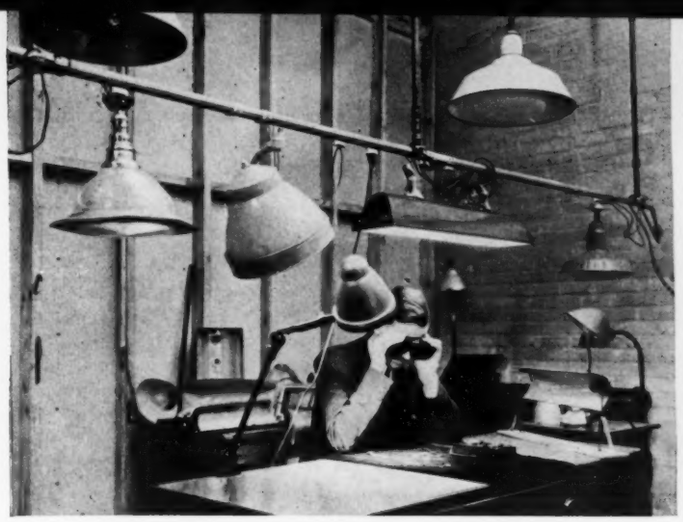
Our 1936 fall program on home lighting, which in addition to our regular sales crews enlisted the participation of all employees and of dealers by making utility lamp stocks available to them, brought results in terms of added load, revenue and low costs as to justify the reasons given above for concentrating on the home-lighting market. The results from that program, which appear above, speak louder than any words can describe them.

I.E.S. LAMP SALES

Sales Group	Employees in Group	Table Studies	Floor Studies	3-Lite General Purpose	Total Lamps sold	†Estimated Annual Revenue	Average E.A.R. per Employee	Per cent E.A.R. Added by Groups
*General employees	482	6,816	1,208	2,827	10,851	$36,793.50	$76.33	51.8
*Sponsors	52	1,547	370	759	2,676	9,166.50	176.27	12.9
Specialty	20	2,607	202	782	3,671	12,186.00	609.30	17.2
Crews	15	2,164	291	1,268	3,643	12,831.00	855.40	18.1
Total	596	13,134	2,071	5,636	20,841	$70,977.00	$124.73	100.00

Total lamps sold	20,841
Total residential and rural meters as of 12–31–36	71,457
Per cent saturation	29.2
Low-use customers purchasing one or more lamps each	3,685

* Regular employee having other duties.
† E.A.R. based on $3 per year for table and floor studies and $4.50 per year for 3-light general purpose.



A simple laboratory allows careful study without interfering with the customer's normal shop routine

General lighting, plus paint, plus supplementary lighting for fine details creates an environment that is easy on eyes

PUT THE

New Industrial Lighting

FACTS TO WORK

By Howard M. Sharp

Manager Lighting Bureau

Buffalo, Niagara & Eastern Power Corporation, Buffalo, N. Y.

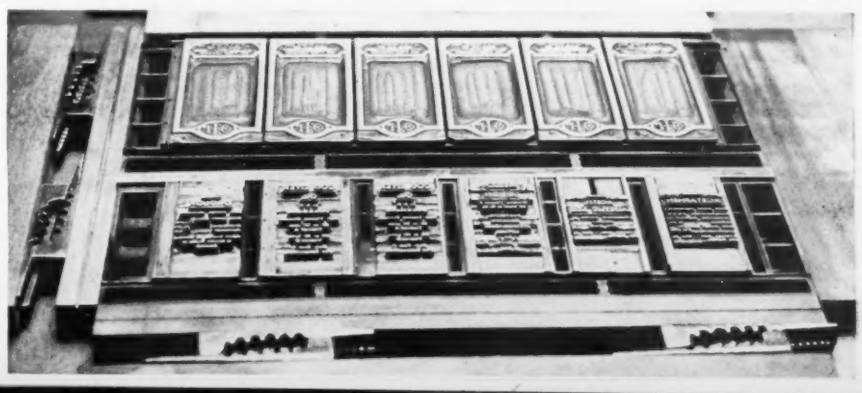
AS THE reports of the various subcommittees of the industrial and school lighting committee of the Illuminating Engineering Society* are completed and published, there is accumulating an extraordinary amount of fundamental lighting information as applied to various industrial processes. Lighting problems have existed in industry for a long time, but have remained unsolved because of a lack of tools, a lack of skilled man-power and a lack of a program. But the past three years has seen the acceptance and understanding of a large amount of seeing data, the development of measuring instruments and new lighting equipment and a growing number of illuminating engineers capable of bridging the gap between industry needs and the lighting prescription.

Out of this came a program, sponsored by the Illuminating Engineering Society, to make careful studies of the lighting bottlenecks of industry and to develop the solutions, or to point out the paths by which solutions can be obtained. It is a cooperative endeavor in which manufacturers, utilities and industry have joined, working objectively to find the answers. As one studies the results, there is no escaping the conclusion that the electrical industry has a plain duty to translate this fundamental data into action. Why? Because these studies unfolded the solutions to lighting problems that have vexed industry for years, and hence will benefit industry generally to a greater degree than the immediate return to the electrical group. But in solving these problems a priceless confidence is established that opens new avenues of approach and that places industrial lighting sales on an entirely new plane.

How is this to be done? Obviously, there is more than one way, but we can speak with conviction about our own program.

We have provided a lighting sales engineer for approximately each 250 industrial customers. A territorial division is established, and within each division the industries are further subdivided by classes and by number of employees. A beginning is made by selecting an industry for which studies have been made and published; the printing industry, for example. The engineer calls, knowing that he has a solution for many of the troublesome problems in the plant. He therefore has the priceless ingredient for any sale—confidence. A basis is soon established between customer and engineer, whereby he becomes the consultant for that plant on lighting problems. Other industries are approached on the same basis, such as candy, shoe, spinning and weaving, and metal working. Direct mail can be of much value, particularly if it draws

A careful study of what has to be seen leads to a satisfactory lighting application



* The studies made by the industrial and school lighting committee of the Illuminating Engineering Society referred to by the author were begun two years ago. Five studies have been made so far. They cover the following industries: (1) Printing, (2) shoe manufacturing, (3) textile (gray goods and denim), (4) candy manufacturing and (5) radio assembly and inspection and small parts manufacturing.—EDITORS.

upon the material contained in the reports. And now comes a curious development.

To apply these solutions, it is necessary to understand thoroughly the correlation of brightness, contrast, distribution, foot-candles, visibility, glare, etc., and to understand the way in which these factors are brought to bear on the particular problem. Hence the spirit, as well as the letter, of the solution must be appreciated.

:NGINEERED LIGHTING DELIVERS THE GOODS
Sheet metal scribing is a very difficult task because the lack of contrast between the line and surface makes the necessary accuracy obtainable only at the expense of extraordinary concentration.
Correct Lighting Makes Seeing Easy
The resulting eye strain impairs the effectiveness of the artesan. Ordinary lighting hinders rather than helps. Scientific lighting, however, developed only after careful studies and tests, produced the results indicated above.
No Guesswork About This Installation. It Does the Job.
have a staff of engineers who will study the lighting problems of your plant from the standnt not only of fixtures, but visibility, surroundings, and contrast. Our recommendations, refore, cover the entire SEEING TASK of the job in question. This service is available withcost or obligation. Why not try it on your toughest job?
3UFFALO GENERAL ELECTRIC COMPANY
WAshington 5700 NIAGARA HUDSON Lighting Bureau

Single idea copy, repeated often, helps to sell the service

and soon the sales engineer begins to approach every lighting problem in the same frame of mind. He sees that lighting is not merely a matter of bulbs and fixtures, but a co-ordination of surroundings, task, eyes and light. He really delves deeply into many of the factors, both mechanical and human, surrounding production, and consequently assists the customer at the point of greatest interest.

I cannot be specific without violating confidences, but we have knowledge of installations where the application of these scientific, objective facts has released, through lighting, a production flow worth many thousands of dollars; of other installations where the quality of product was improved to a point where large orders were received against competition formerly unbeatable; of plants where the effect of correct lighting on employee feelings has been so marked that management has stated that the cost of improvement was well met without the other by-products.

Does this scientific approach tend to restrict the activity, tend to make it subjective? We believe that such a tendency would be a defect of supervision, not of method. Does it result in a multitude of small installations at relatively high cost? We have not found it so. The approaching problem may be small, but the expansion is rapid. During the past year our average installation per industry has been 10 kw. and in no case are we finished. In all seriousness, it is only the beginning. Our present rate of load addition is about 250 kw. a year a man. Next year this will go to 400 kw., because our participation in one of the industrial research subcommittees will have ended, due to completion of studies, thus releasing manpower for increased customer contact.

This is a time when the word "new" is overworked, but I know of no better term for this than "the new approach to an old problem—industrial lighting." The Illuminating Engineering Society subcommittees have opened new frontiers; the practitioners in the field can create new methods, new prestige, new friends. It is not a job to be taken casually, but earnestly and continually. It is a job that will raise the prestige of the illuminating engineer and create new standards of performance. Manufacturers' jobbers and utilities must unite in supplying equipment, distribution, man-power and education so that "the facts of the situation can be put to work."

A Dollar's Worth of Light

FOR EVERY DOLLAR EXPENDED

By G. F. Hoffmann
Research Staff, Pittsburgh Plate Glass Company

THE marvelous progress made in the electrical and lighting industries has done much to improve and perfect artificial lighting. Much of this improvement is left ineffective, however, or latent without the aid of proper painting as a necessary accessory. Ceilings and walls are in effect giant reflectors of light. A mere glance at light reflection values for colors is very enlightening in showing the great difference between the high reflection from white and the low reflections from colors in general.

In this respect it is most amusing to consider that in the past, when artificial lights were much less efficient and intense than now, almost solid colored paints were quite generally used, resulting in greatly reducing the already inadequate light. The adoption of pastel tints together with white for interior walls and ceilings, so that light reflection runs between 44 and 80 per cent for the colors and from 85 to 92 per cent for the white, has been a contemporary step in progress with improved lighting equipment.

Following the collection of scientifically correct data on light reflectivity from various pastel colors and surfaces, the real effect of putting such knowledge to practical use has been carefully checked. A simple case exemplifying these facts makes a very convincing and unquestionable demonstration.

Two identical rooms are painted—one with colored ceiling and walls, or gray to emulate average soiled walls; the other with white ceiling and pastel colored walls. A 125-watt lamp is put in the former and a 75-watt lamp in the latter. Despite the much weaker lamp in the pastel colored room, actual readings of light intensities made with a photoelectric light meter shows it as having better than twice the light intensity of the dark colored room with the stronger light. It is readily apparent from this that less than one-third as much artificial light is required where ceilings and walls are properly painted.

Month	Customer A			Customer B			Customer C			Customer D		
	1935 Kw.-Hr.	1936 Kw.-Hr.	Kw.-Hr. Inc. or Dec.	1935 Kw.-Hr.	1936 Kw.-Hr.	Kw.-Hr. Inc. or Dec.	1935 Kw.-Hr.	1936 Kw.-Hr.	Kw.-Hr. Inc. or Dec.	1935 Kw.-Hr.	1936 Kw.-Hr.	Kw.-Hr. Inc. or Dec.
January	8,480	15,170	6,690	8,720	9,600	880	2,780	2,886	106	2,694	3,364	670
February	9,280	14,960	5,680	8,800	9,320	520	2,520	2,700	180	2,360	3,088	728
March	8,240	14,160	5,920	7,440	8,920	1,480	2,020	2,366	346	1,994	2,592	598
April	9,600	15,600	6,000	7,880	9,680	1,800	2,320	2,712	392	1,904	2,338	434
May	9,440	13,440	4,000	7,760	8,600	840	2,040	2,783	743	1,558	1,826	268
June	9,440	13,760	4,320	7,560	8,840	1,280	2,050	2,740	690	1,302	1,544	242
July	8,960	12,320	3,360	6,920	7,320	400	1,910	2,620	710	1,416	1,696	280
August	9,440	13,120	3,680	6,320	8,080	1,760	1,802	2,680	878	1,424	1,860	436
September	10,320	13,840	3,520	7,440	9,960	2,520	1,894	2,680	786	1,473	2,028	555
October	12,960	15,440	2,480	8,440	13,160	4,720	2,479	3,160	681	1,695	2,116	421
November	14,560	16,240	1,680	10,120	13,760	3,640	2,728	3,440	712	2,560	3,034	474
December	16,480	18,720	2,240	11,360	16,480	5,120	3,793	4,840	1,047	2,782	3,156	374
Total	127,200	176,770	49,570	98,760	123,720	24,960	28,336	35,607	7,271	23,162	28,642	5,480

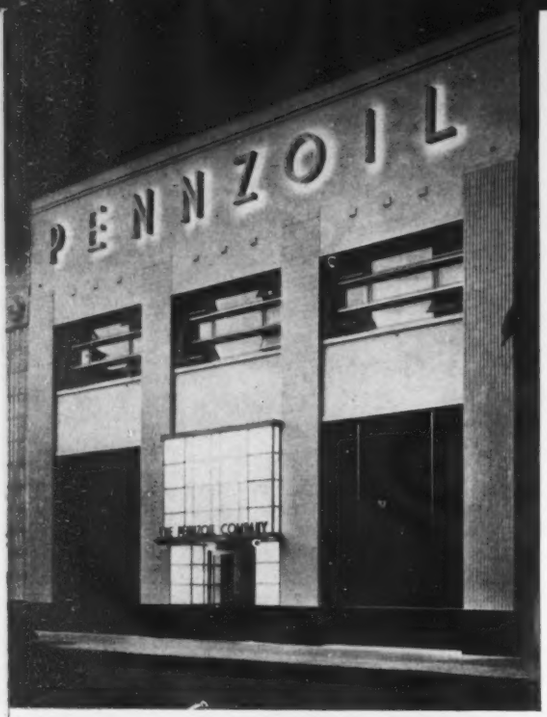
Commercial Lighting Sales Results

By J. A. Jobert
Lexington Utilities Company, Lexington, Ky.

SOME interesting figures of energy usage as the result of store relighting are shown here. These eight stores, which represent large and small establishments, are on the line of the Lexington Utilities Company, which for the past four years has been developing this market actively. The company serves 2,400 commercial customers, the large majority of whom have small establishments. Only 300 customers average more than 800 kw.-hr. per month. Campaigns are conducted during the year on floodlighting, signlighting, store and window lighting and minimum-bill customers.

That the commercial lighting activities have paid the company well is attested by the fact that in 1936 it sold 462 relighting jobs, which is equivalent to nearly 20 per cent of the total number of commercial customers. How well these relighting jobs increase consumption may be judged from the figures given in the accompanying tables for eight representative stores.

Month	Customer E			Customer F			Customer G			Customer H		
	1935 Kw.-Hr.	1936 Kw.-Hr.	Kw.-Hr. Inc. or Dec.	1935 Kw.-Hr.	1936 Kw.-Hr.	Kw.-Hr. Inc. or Dec.	1935 Kw.-Hr.	1936 Kw.-Hr.	Kw.-Hr. Inc. or Dec.	1935 Kw.-Hr.	1936 Kw.-Hr.	Kw.-Hr. Inc. or Dec.
January	3,476	3,330	—146	210	204	—6	430	332	—98	34	206	172
February	3,553	3,410	—143	194	228	34	402	310	—92	22	126	104
March	3,145	3,304	159	178	198	20	352	480	128	32	112	80
April	3,279	4,036	757	194	184	—10	345	696	351	46	114	68
May	3,171	3,816	645	170	180	10	299	498	199	28	78	50
June	3,330	3,828	498	182	176	—6	252	434	182	54	144	90
July	3,596	3,506	—90	162	184	22	242	574	332	26	146	120
August	3,356	4,656	1,300	164	310	146	294	680	386	28	186	158
September	3,233	3,686	453	190	278	88	240	696	456	60	202	142
October	3,161	3,982	821	202	376	174	228	746	518	42	238	196
November	3,294	4,420	126	254	394	140	270	1,162	892	220	310	90
December	3,350	4,842	1,492	256	396	146	270	1,094	824	190	390	200
Total	39,944	46,816	6,872	2,356	3,108	752	3,624	7,702	4,078	782	2,252	1,470



DAIRY STORE—Luminous treatment of appropriate character may frequently be attached to existing buildings. The Cedar Hill Farms dairy store in Mariemont, near Cincinnati, Ohio, has a total wattage of 6,400 and an estimated annual consumption of 11,500 kw.-hr.

Luminous Displays BUILD REVENUE

By W. M. Potter
General Electric Company
Nela Park Engineering Department
Cleveland, Ohio

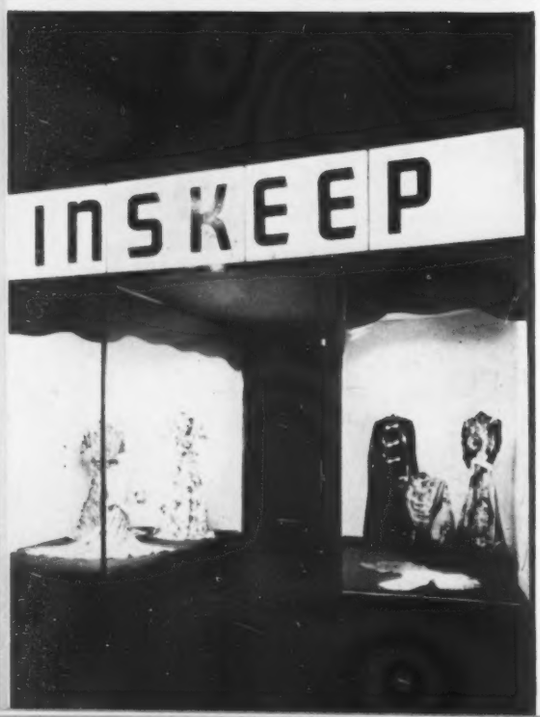
A GREAT field of revenue-building opportunities for the electric utility is opening with the growing appreciation by the merchant of the values created by light when it is incorporated in the architectural design of buildings. Modern luminous architecture, skillfully made a part of the exterior design, has numerous advantages for the commercial customer which may be translated into added kilowatt-hours.

One outstanding characteristic of effective display is individuality, the expression or symbolism of what is unique in a business or product. Luminous architecture, since it may employ a large number of interesting materials, lighting effects and structural forms as part of a pleasing design, results in displays of great variety and effectiveness, adapted to the requirements of the particular business. It may be used with existing buildings as well as new buildings, with the most modest store front as well as the most ambitious project. It offers a daytime as well as a night-time architectural effect, enlivens the business-street picture, attracts trade and puts the merchant before the public in an unmistakable and pleasing manner.

Because of the effectiveness of

OFFICE BUILDING—(Above) Luminous treatment, integral with modernization in a new facade for the Pennzoil Company, Los Angeles, Cal. The silhouette sign and dominating entrance element of translucent glass will consume about 19,000 kw.-hr. per year, with 10.3 kw. connected load.

Designed and installed by Luminous Structures, Inc., Los Angeles.



TAPROOM—(Center) This entirely luminous small front in Chicago is made of diffusing, colorful Vitrolux glass. The central area is light yellow, the border and large letters in translucent red. Lamps totaling about 2,800 watts are used and the kilowatt-hours per year would be about 5,000.

Palmer Personal Service Company, Chicago, architects.

DRESS SHOP—A "three-second selling" front for a small shop in Elyria, Ohio. This installation employs a simple and effective fascia sign and good show window lighting for single idea displays seen against light window backgrounds. Twenty-four 50-watt lamps light the luminous panel; 1,200 watts total; about 2,200 kw.-hr. per year, in addition to improved lighting in interiors and windows.

Gouverneur M. Peek, DeLand, Fla., architect.

PUBLIC UTILITY BUILDING—Distinctive display and an example of a practical, effective luminous treatment applicable to many commercial buildings were obtained when the Florida Public Service Company remodeled a building for its office in DeLand. The diffusing glass luminous element is lighted by 54 75-watt lamps spaced in a white finished inclosure behind the glass. Sign letters are of Masonite, water-proofed, and finished in black enamel to contrast with the white surface by day.

HARDWARE STORE—(Below) A large number of existing store buildings offer a tremendous opportunity for the sale of luminous fascia sign transom treatments, which may be the only alteration, or part of the complete modernization of the front. Such a simple treatment offers an excellent entering wedge for the promotion and sale of more elaborate luminous architectural treatments. In the case of the Fruehauf Hardware Company, in an outlying district of Cleveland, a load of approximately 2 kw. is used, accounting for about 3,600 kw.-hr. per year.

Hays and Simpson, Cleveland, Ohio, architects.

HAMBURGER STAND—A brilliant luminous canopy in this Kewpee Hotels hamburger stand at Toledo, Ohio, produces display value and illumination for walls and surroundings. Its face carries two luminous bands in orange; top and bottom are of diffusing white glass. Two circuits of alternate 60- and 100-watt lamps, 47 each, provide flexibility in brightness for various periods of the night. Long hours of operation each day lead to an estimate of about 21,000 kw.-hr. per year for this single installation.

luminous advertising combined with store modernization, we find noteworthy gains in sales volume. For example, a jewelry store reports 20 per cent increase in sales and a service station tripled its volume of business. These are two typical examples of what this type of sales promotion can readily accomplish.

The wattage sold in such installations varies from a few hundred watts to 10 or 20 kw., depending on the size of the design, the brightness required in a given location, the materials and the effects employed, etc. An analysis of one hundred installations for varied commercial structures indicates that an average load of about 4 or 5 kw. is now employed. This group, of course, included many of the smaller installations in which the conversion of a store-front transom to an effective luminous fascia display was the principal feature.

Hours of operation are important in building annual revenue. Luminous architectural treatment, as well as the typical sign, operates some 1,800 hours per year on the average, though the customer obtains daytime (unlighted) value as well. An installation of 4 kw., therefore, may consume some 7,200 kw.-hr. per year. One central station estimates that such load produces revenue at the rate of $97.28 per kilowatt per year.

It is to be considered that such lighting has a cumulative effect in that one good installation will lead to many other and better installations.

To secure such business it is necessary not only to acquaint the merchant, for example, with the advantages and luminous effects obtainable in a store front, but also to secure a source capable of planning and supplying effective installations. Architects and designers should be acquainted with the possibilities in luminous effects, with the available materials which may be used and shown how to insure that the lighting is well done. Sign companies, modernizers of buildings, contractors and others with sales ability may offer the nucleus for an assembly of skill in architectural and structural design, lighting engineering, estimating, fabrication and installation, which will be necessary to present a complete project to the prospect and follow through to a successful installation. And it should be remembered that central station revenue is dependent upon maintenance, which should be sold with each installation.

Residential Lighting Potentialities

AFTER DEMONSTRATION BY HOME-LIGHTING ADVISER

By E. J. Ingram
Metropolitan Edison Company, Reading, Pa.

TOO few utilities have given home lighting its due importance in their new-business scheme of operations. Utilities which should have such an operation are without one. Many other companies now operating home-lighting departments are doing so on a small scale, based on the potentialities. In my opinion this is because most lighting departments report to a new-business manager who is a product of the merchandise side of the new-business utility operation.

Most home-lighting operations are essentially on a service approach basis, with the dollars and cents volume of the merchandise involved of secondary importance. The problem is to make new-business executives home-lighting minded, where they are now so-called "major" appliance-minded—especially electric refrigerators, electric ranges and electric water heaters.

They must be convinced that home lighting can be "major" as well. These other domestic sales efforts should not be abandoned or curtailed, but home lighting should receive its merited status in the new-business endeavor.

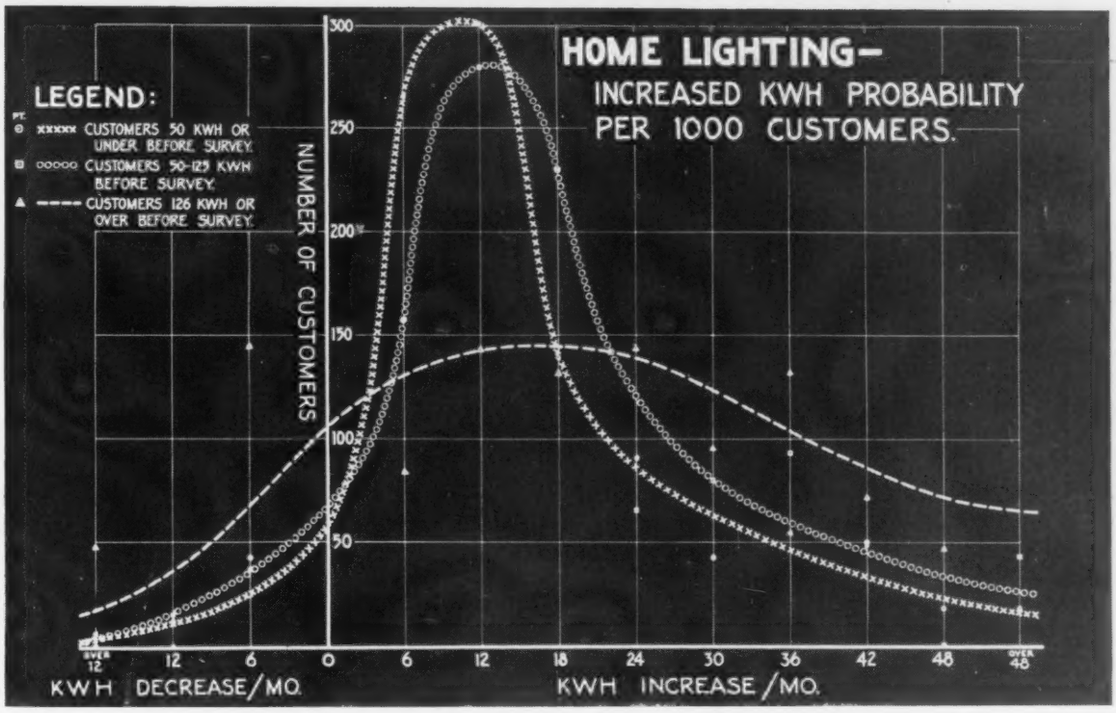
We have all seen lighting intensities rise. Ten, twenty, thirty, fifty and a hundred foot-candles of illumination are not beyond accomplishment. Back of this we have a positive conviction, upon which is based lighting's battle cry, that "it is only the beginning." Surely, therefore, home lighting warrants justifiable, equitable consideration in the utility new-business program, along with other major electric appliances.

Today we are attempting to judge most home-lighting operations on either the total kilowatt-hours secured per home-lighting adviser or on the wattage installed per demonstration. I personally do not feel that either is the answer. I believe that the true evaluation of home-lighting operation is: "How many more kilowatt-hours are put on the meter." In fact, the obtaining of a higher load factor on existing facilities is of far greater value to the utility than a large increased connected load if that connected load is not used. It is too bad that more new-business utility executives will not take home lighting on faith for six months or longer and then check the meter consumptions on customers where demonstrations have been given. The meter consumptions, rather than any connected load story, would indicate the true value of home lighting.

Of course, to compile such information it is impossible to take recent demonstration jobs, as it is necessary to have six months consumption after the demonstration had been given, to form a basis for analysis. From the demonstrations given prior to October, 1935, we selected at random more than 500 customers, regardless of whether we had reported increases or not for such customers. On these 500 customers we checked the consumption for the six months after the demonstration and then for the same six months the year previous. We threw out all cases where full data at the same address for each six-month period was not available. We then averaged the consumptions based on these six months figures and threw out all cases where the average increase was more than 48 kw.-hr. per month and all cases where the average decrease was more than 12 kw.-hr. per month. The number of these cases is shown by the points on the accompanying chart. By throwing out those cases with a 48-kw.-hr. per month increase we removed the probability of a major appliance having been added.

Unfortunately every case where a demonstration is given does not result in increased kilowatt-hour consumption. If we think it does, or predicate our operation on that, we are only kidding ourselves and others. This is another reason why kilowatt-hour consumption is a truer index of the value of home-lighting operation, as a connected load check might show an increase and be reported or implied as indicating additional kilowatt-hour consumption and increased revenue, whereas an actual survey of the account might show a loss. Any customer in this random selection who has replaced an old refrigerator with a new one has decreased his usage due to the decreased consumption of the newer model, and consequently the remainder figures for home-lighting analysis are penalized by such reduction.

After throwing out the cases as stated, the remaining customers were divided into three groups—those under 50 kw.-hr. consumption per month before the demonstration, those be-



The probable monthly increase in consumption per home-lighting demonstration in terms of small, medium and large-use customers

tween 50 kw.-hr. and 125 and those over 125 kw.-hr. There were 390 accounts left, and they divided 166 in the low bracket, 140 in the middle bracket and 84 in the top bracket.

Engineers will contend, and justly so, that all happenings covering a number of possibilities will always fall into a probability curve. I have seen this demonstrated on many, many occasions and felt it might be interesting to plot a resultant probability curve on these data. Steps of 6 kw.-hr. each were taken, both plus and minus. If we were to plot our findings directly it would not mean much, because there were more customers falling in one group than in the others, and the probability curves could not directly be compared. Therefore, our number of individual customers within each 6 kw.-hr. step in each group had to be prorated on the basis of 1,000 customers. The chart is so plotted, and thus permits direct comparison.

In analyzing potentialities of a home-lighting department consideration must be given as to where the majority of your customers will fall. These data would indicate that an expectancy of possibly 12 to 14 kw.-hr. increase per month per home-lighting demonstration might be a fair conservative criterion of an operation covering all customers served by the company. These data were based on demonstrations made fairly early in our operation, and we believe our operation has improved since. A probability curve on only the 390 customers averages about 17 kw.-hr. per month because we had been at that time working on customers averaging slightly higher than system average customers. Notice that in the customers over 125 kw.-hr. per month the probability curve is much flatter, indicating that almost any results might be obtained, but that in the two other curves very definite peaks are established, indicating that very definite absolute results may be forecast for the operation on all electric customers served by the company.

By-products

Besides the added lighting load, there are several by-products from such an activity that are of considerable value. The home-lighting advisers in just one division in twelve months turned in appliance tip-offs, of which 122 were closed—sixty being major appliances with a dollar volume of $9,610.13.

While the primary value of the home-lighting advisers' contacts is placed on the revenue-building possibilities, a new consciousness of the operation's value toward furthering better public relations has been developed. Satisfaction has been realized by the advisers in overcoming disagreeable, dissatisfied and antagonistic attitudes often found in customers' minds. Little recognition has been given to this phase of the work, and on the surface it carries no immediate remunerative advantages. However, it is felt that this type of contact has a value over and beyond that which can be definitely measured in dollars and cents direct new business.

In more than eighteen months of our home-lighting operation we have had only one dealer complaint regarding our operation and not a single customer complaint. We have received literally hundreds of letters complimenting the company on our service.

Cost

Since January 1, 1936, we have made a very accurate check of the expenses of our home-lighting operation. Including all our advisers, all materials they consume, all direct and central office home-lighting supervision, stenographic personnel, transportation, insurance, welfare, stationery, supplies, advertising, etc., but excluding rent, light, heat, power and district and central office executive supervision, the cost of the home-lighting operation has been less than $140 per month for each of our home-lighting supervisors and advisers.

Lighting for Traffic

AN INDUSTRY

Intersection, Groton, Conn.—Staggered 250-watt high-intensity mercury-vapor units spaced 160 to 200 ft.

Westinghouse

IN 1917, 4,983,000 cars drove an average of 3,000 miles, or a total of about 15,000,000,000 miles. The average speed was about 25 miles an hour. In 1917 visibility afforded for night driving by headlights was from 200 to 250 feet.

In 1936, 28,270,000 cars traveled an average of close to 8,000 miles per car, or a total mileage of more than 218,000,000,000 miles. The average speed had jumped to nearly 45 miles an hour—and the headlight visibility was still 200 to 250 feet.

During that period—from 1917 to 1936—most traffic danger factors had increased many-fold: Registration, 600 per cent; average mileage per car, 125 per cent; total annual mileage, 1,300 per cent; average speed, 100 per cent. At the same time automobiles had been improved almost beyond recognition; surfaced roads had not only increased in extent from about about 300,000 miles in 1917 to more than 1,000,000 miles in 1935, but had passed through a revolutionary change in the technical aspects of construction, zoning, marking, etc.

But little advance over that entire period had been made in the lighting of highways. And what has happened: From 1917, when night traffic fatalities represented only 30 per cent of the total, they increased to more than 60 per cent of the total in 1935, when 21,480 people were killed after dark. Only 15,000 were killed in daylight hours by four times as many cars. In several typical locations fatalities have been found to be 100 per cent greater during the evening rush hours when it is dark than during those same rush hours in the summer when it is light.

The failure to give the modern driver adequate light for night driving lies more in the failure to put into practice, than in the failure of the industry to develop, products which meet the needs of the time. Today it is entirely practical, both technically and economically, to provide 700 to 1,200 feet of visibility with modern safety highway lighting equipment. Of course there are many other factors which contribute to safe driving, but there is one point that is not generally recognized, and that is that lighting is an all-over factor in safety. With the coming of night the road doesn't change; neither does the driver, the car, the enforcement—but with darkness the dangerous road becomes more dangerous, the bad driver worse, the drunken driver more muddled, the unmarked pedestrian more hidden. As light fades, eye strain increases, fatigue comes quickly, color and distance judgment become less acute.

And all of this is simply to show that the electrical industry has an obligation and an opportunity. Light is needed—the electrical industry produces light. And regardless of opposition by other commercial interests highway lighting is coming—the need for it is too basic, too crying—its possibilities too practical.

Some time ago the Street and Highway Lighting Safety Bureau was organized to co-ordinate the thinking of the industry into a uniform policy, to establish definite industry objectives and to carry on co-operatively certain educational activities.

Test Highway, Dayton, Ohio—1½ miles of brick road lighted with 4,000-lumen high-visibility units spaced 125 feet one side

General Electric

Traffic Circle, Latham's Corners, N. Y.—Lighted with 31 sodium units spaced 80 ft.

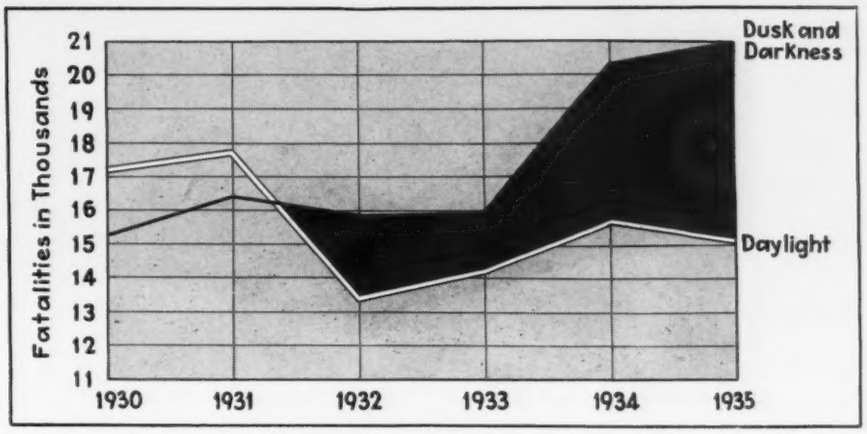
General Electric

Safety

OPPORTUNITY

By E. M. Rice

Secretary
Street and Highway Lighting Safety Bureau



The dark space represents lives that highway lighting can save

It is important to state just what the objectives of the industry are because they have been so often misinterpreted and misstated:

First—The industry does not maintain that highway lighting is the whole answer to the traffic accident problem. It realizes, as any one must, that that problem is complex and must be attacked on many fronts by a broad safety program. Such a program might briefly be outlined as follows:

Physical and Constructional Factors:

(a) Widen or divide the main arterial highways; ease and bank curves.

(b) Construct or improve secondary arteries to divert traffic.

(c) Overpasses and underpasses for dangerous railroad crossings and highway intersections.

(d) High-visibility traffic signals, roadway markers, signs and guard rails.

(e) Construction of sidewalks in night accident zones where advisable.

(f) Installation of highway safety lighting in night accident zones.

Educational and Enforcement Factors:

(a) Driver education.

(b) Inspection of cars to insure their mechanical safety.

(c) Vigilant patrol and law enforcement.

Legislative Factors:

(a) Adequate laws and ordinances to insure physical competence of drivers, mechanical safety of cars and traffic and motor vehicle regulation.

The industry does believe, however, that the only major factor of difference between night driving and day driving is darkness; as all other factors are equal, night fatalities should be far less than day fatalities because only one-fifth to one-fourth of traffic moves at night. The fact that this is not so, and that night fatalities far exceed those in the day time, leads logically to the conclusion that there is a segment of accident and fatality experience almost entirely due to lack of light.

The chart that appears above shows the comparative night and day fatality expreience from 1930 through 1935 and indicates the astonishing and still rising increase of night deaths. The area in black represents a minimum of lives that it should be possible to save by adequate highway lighting—a minimum because it is based only on the equalization of night and day fatalities and does not take into consideration the traffic density factor, which would indicate that the night rate should be much less than by day as it was in 1930.

Second—The industry has not as an objective the indiscriminate lighting of all highways or of any given mileage of highway arbitrarily chosen. It believes that any advance should be made soundly and on a basis of all factual data that it is possible to gather. At the present time it indorses the installation of highway lighting only when night accident rates on a given stretch of road, at intersections, railroad crossings, etc., or where convenience, appearance or other factors entirely warrant the expense—that decision must come, of course, from local authorities.

As an interest devoted more than most to public service, the electrical industry, and especially the electric utilities, can do much to educate the public, and their representatives, in the potentialities of safe highway lighting. In this work they will find many public bodies that will be glad to give them assistance. Three educational programs, conducted by the Street and Highway Lighting Safety Bureau, were sponsored, one by a newspaper in Albany, N. Y.; one by an automobile club in Dayton, Ohio, and one by a safety council in Saginaw, Mich.

Finally and fortunately, highway lighting for safety offers an extensive and profitable market for electrical products and energy. If it did not, its future would be far more doubtful. The whole history of progress in this country is a history of needed services that our ingenuity has found it possible to produce at a profit.

Highway, Chicopee Falls, Mass.—Lighted with 6,000-lumen sodium units spaced 200 ft. one side

Westinghouse

LAYING THE FOUNDATION FOR

Farm Lighting Load

By John L. Burgan

New York State Electric & Gas Corporation, Geneva, N. Y.

LIGHTING the farmstead is a problem which has given us a lot of concern. The farmer has been used to oil lamps and does not appreciate the necessity for the higher lighting values which the electrical industry is promoting as an aid to better vision. It was apparent, therefore, that we had an educational job to do and that it must begin in the elementary department.

Two things are stressed in this initial educational program—enough light and shaded light. We begin by showing our new farm customers that with electric lighting the eye is subjected to light intensities greater than where oil lamps are used, and therefore all bulbs must be shaded to prevent direct glare. We also emphasize the value of good vision and the preservation of eyesight and show how this can be accomplished through the use of enough light.

To carry out the educational program we arrange meetings with groups of prospective users and different farm organizations. These groups vary from 30 to 120 people. Mostly only prospective users are invited to these meetings, although there are exceptions to the rule. Sometimes the meetings are arranged for by our district representatives entirely, but mostly they are suggested by our representative and arranged for by the county agent.

Sometimes these meetings are held in homes, but as a rule they take place in the grange or town hall. Where a home is selected, it is usually one that is centrally located and has electricity. In these cases the customer may be given a cake or a large steak for the use of his home. To secure enough outlets for our working display we usually have to run temporary service lines.

Solicits surveys

These meetings, of which we have probably held fifteen this past year, averaging about three to each district, last about two hours. Many types of lighting fixtures are on display and their use is explained by our home-service-lighting girls. At this time we solicit the opportunity to make a survey in the homes of those attending the meeting.

On the visit of the home-service-lighting representative arrangements are made for proper outlets at the most convenient and most suitable places throughout the home as well as for the lighting fixtures. When this has been done our next call is to show some of the modern lamps and leave them for demonstration. This usually results in the sale of at least one lamp and some adapters for bedroom use.

While at these meetings we do not usually light the barn, poultry houses or yard as a demonstration, we do try to sell such installations when we are planning the farmhouse lighting. We point out how adequate barn lighting will shorten the work hours and increase safety; how yard lighting will keep prowlers away and at the same time reduce accidents; how poultry house lighting will increase production and how shop lighting will make it possible to get things mended that otherwise would have to be left undone. As a result, we have been able to sell outbuilding lighting in 90 per cent of the cases.

We have also worked very closely with contractors and dealers in our territory so that they can help in recommending adequate and correct lighting equipment for the farm. In addition we have had splendid co-operation from Cornell University.

To build farm-lighting load is something like selling fire insurance or lightning rod protection—few ask for it. Nevertheless, with time and patience, persistent selling, both by personal contact and advertising, backed up by proof of value of each recommendation, has enabled us to induce approximately 90 per cent of our new farm customers to use better lighting than they had originally planned.

It is our opinion that in the very near future we will be able to increase materially our rural lighting load as the result of this simple but effective basic plan of co-ordinating education and sales.

Building Up THE LOAD

New ideas and practices in selling electrical equipment and service to commercial and domestic customers

New Units for Old Holds Range Load

By L. W. SYMONS
Lake Superior District Power Company, Ashland, Wis.

Slow cooking of ranges sold ten and more years ago was found to be a real obstacle against widespread acceptance of electric cooking when the Lake Superior District Power Company began actively to build domestic load. We realized that this obstacle would have to be removed before real progress could be made, that we would have to show existing users how much progress had been made since their ranges had been purchased.

The biggest selling point we had to talk about was the high-speed inclosed type unit. Practically all of the ranges in service were equipped with open type units. We had a standard Calrod unit cut down to fit the opening in the older ranges so that in appearance it was like the standard factory unit furnished with the new ranges.

In order to replace as many of the old open type units as quickly and efficiently as possible, we hired a young man who gave his entire time to this job. He called on every range user, carrying the replacement units with him in his car and making the change or installing them on free trial, if necessary. Thus, in about a year's time, we sold approximately 900 replacement units.

Purchase of these units was made easy for the customer, inasmuch as they were sold for 50 and 75 cents down and the balance at the rate of 50 and 75 cents a month. Since they were purchased at special prices as replacement units, we were able to offer the purchaser an allowance of $2 for the old unit and to pay the salesman $1 commission on each unit he sold. While it is true we did not make any money on the sale of these units, it is also true that we had not intended to do so since we then were losing some customers to bottled gas ranges. We feel we were repaid the replacement cost by retaining electric range load.

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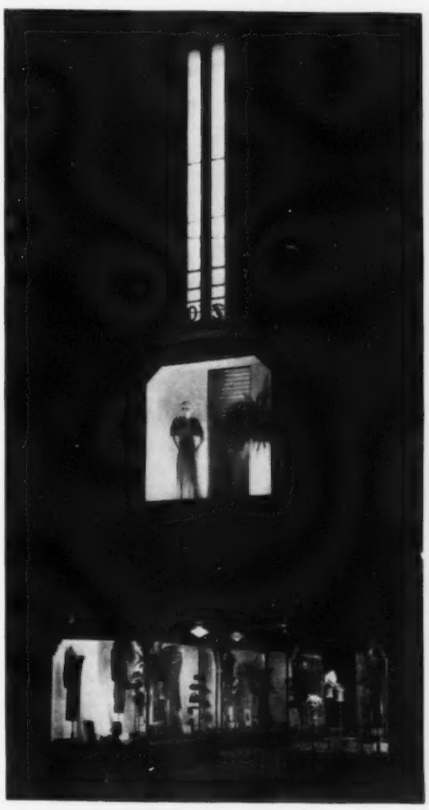
STORE MODERNIZATION



Grand Rapids Store Equipment Company

Pleased with the results obtained from the installation of modern lighting on the first floor, Mr. Cox of McKeesport, Pa., started a complete store modernization. Besides this new luminous front, his store has modern window lighting, built-in lighting on the second floor, special showcase lighting and air conditioning.

Sub-Meters Show Cause of High Bills

When a customer of the Kansas City Power & Light Company objected because his bill totaled $45.57 for a month's use (1,449 kw.-hr.) of electricity on his suburban estate the company proceeded with sub-metering and a general check-up. Result: Customer's bill was reduced 50 per cent.

Connected load included an electric range, 6-cu.ft. refrigerator, 80-gal. water heater—which, it turned out, was not on the water heater rate—two radios, circulating fan on an oil furnace and 1,500 watts in lighting. Submetering revealed:

Lighting, 168 kw.-hr.—30 kw.-hr. at 8½ cents, 31 kw.-hr. at 4½ cents, 108 kw.-hr. at 3 cents.....	$7.14
Radio, large—12 kw.-hr. at 3 cents..	0.36
Radio, small—8 kw.-hr. at 3 cents..	0.24
Water pump—10 kw.-hr. at 3 cents..	0.30
Furnace fan—107 kw.-hr. at 3 cents..	3.21
Refrigerator—71 kw.-hr. at 3 cents..	2.13
Range—225 kw.-hr. at 3 cents.....	6.75
Water heater—484 kw.-hr. at 3 cents	25.44
Total—1,449 kw.-hr.....	$45.57

As a result of this check-up by the company, the customer signed a water heating contract offering him the special water heating rate. He also accepted the suggestion of the company to change the water piping to a non-circulating system, effecting a saving of 197 kw.-hr. a month.

The customer's consumption and cost for the first month after the change:

Lighting and appliances—686 kw.-hr.	$22.68
Water heating—370 kw.-hr.....	3.70
Total 1,056 kw.-hr.....	$26.38

Field OPERATING PRACTICES

New ideas and practices in the operation of well-designed, constructed and maintained plants and systems

Spray Bronze Lining on Steel Cylinder

By J. C. GAYLORD
Hydro Engineer
Southern California Edison Company, Ltd.,
Los Angeles, Calif.

Recently when it was necessary to renew the non-corrosive lining in the operating cylinder of one of the four 34-in. lower penstock valves at Big Creek No. 2A power house it was decided to put a new bronze lining in the cylinder by means of the metal spray process.

The inside surafce was cleaned and trued by removing the corroded metal and roughness. Before spraying was started, the whole cylinder was inclosed and warmed for twelve hours by a 5-kw. electric heater.

In order to get an intimate bond between the spray metal and the cylinder walls a fine thread, about 1/16-in. pitch and about 1/32-in. deep, was cut over the entire surface where the spray metal was to be applied.

Set-up was made at the end of a lathe with the axis of the cylinder parallel to the lathe bed. As the cylinder was rotated at 4 r.p.m. a metal spray gun mounted on an angle extension of the lathe carriage was made to travel back and forth, with the lathe carriage advancing 5/32 in. per revolution. The nozzle of the gun was set about 5 in. from the surface to be sprayed.

It took about 90 minutes spraying time for each layer of metal deposited. The maximum variation in diameter from end to end was less than 0.001 in. Time only will tell, but the finished lining appeared to be very satisfactory and the repair was made at a reasonable cost.

Use metal spray to reline operating cylinder of 34-in. penstock valve that operates at over 1,000 lb. per sq.in. pressure

Cylinder was rotated on rollers with spray gun moved back and forth on a lathe carriage extension. Weight of cylinders 6½ tons, inside diameter 46 in., length 53 in., wall thickness 13½ in. Diameter of flanges 59 in. and 65 in.

•

Spark Plugs Check Transformer Oil

In all well-maintained systems the oil in transformers is pretty carefully watched and it is not very often one hears of a transformer failure resulting from oil deterioration. But with all the effectiveness of maintenance routine, the operating man often feels easier in mind if he has a way of his own to check up on this, that or the other thing that he regards as particularly important, as, for instance, the oil in the high-voltage transmission line transformers.

At the plant of the Mississippi River Power Company, Keokuk, Iowa, all of the water-cooled transformers are equipped with spark plugs; not, however, for the usual spark plug service. The spark plug is connected in series with an alarm bell across the 110-volt lighting circuit, which is continuously energized; thus a few drops of water at the low point in the transformer tank completes the circuit through the spark plug and rings the alarm bell until the operator discovers the condition and takes such action as is necessary to prevent destruction of the transformer because of wet oil.

A small lamp continuously burns across the lighting circuit near the location of the spark plug, merely for the purpose of indicating that the cir-

NOW 3 TYPES OF CLOTH-INSULATED CABLE

. . . . afford a choice from which to select the type best fitted for each job

YOU are no longer limited to the standard varnish-cambric for all jobs that call for a cloth-insulated cable. Of course, you can still get that old reliable—better now than it ever was—and, in addition, two other types: high-temperature and Glyptal. Here are facts that will help you to decide which type is best adapted for a particular job.

If you are at all in doubt as to which type is the best, a G-E cable specialist will be glad to help. The samples offered below will give you a still better idea of these types as well as of the quality of the cloth. Send the coupon to the nearest G-E sales office, or General Electric, Dept. 6B-201, Schenectady, N. Y.

No. 995 Cloth (Center)

This is the standard varnished-cambric. Cable insulated with it is adapted for general all-round work—up to 10,000 volts for three-conductor belted, lead-covered cable; up to 26,000 volts for single-conductor or multiconductor shielded . . . . with a conductor temperature not exceeding 75C-E*.

No. 1797 Cloth (Left)

This is the high-temperature cloth. Cable insulated with it is for the same service as black varnished-cambric, but is capable of being operated at the higher conductor temperature of 90C-E* (with a maximum of 85C) at voltages up to 7500. For voltages above 7500 and up to 15,000 the maximum allowable conductor temperature is 75C. Where heating is the limiting feature, this cable will show savings in copper and in duct space.

No. 1780 Cloth (Right)

This is the Glyptal cloth. Cable insulated with it is oil-resisting, tough, and long-lived. It can be operated at a conductor temperature of 85C at no more than 600 volts. It is recommended for low-voltage power circuits, for rewiring industrial and mining locomotives, and for general-purpose motor wiring.

**Where E = voltage in kv. Thus, the maximum conductor temperature in degrees centigrade (C) is obtained by subtracting the voltage rating in kilovolts from 75 or 90.*

FREE SAMPLES

General Electric,
Dept. 6-201,
Schenectady, N. Y.

Please send me a set of samples (GES-1657) of varnished cloth used for insulating G-E cable.

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Address .....

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520 117

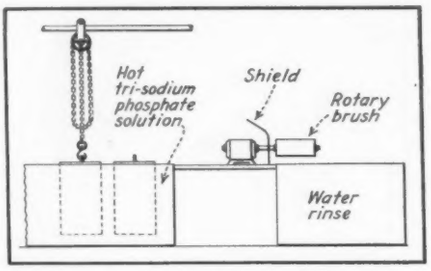
GENERAL ELECTRIC

cuit has not been disconnected and that the plug used for testing purposes is properly energized.

•

Returned to Service as Good as New

When line insulators are returned to service from the warehouses of the Union Electric Company of Missouri, St. Louis, they are, to all intents and purposes, the same as new. This is because when they were taken out of service and turned back to the stores



Layout for cleaning line insulators

department they were thoroughly cleaned and packed into cartons before being returned to stock.

Cleaning an insulator that has stood out in the wind and weather for a period of years is not a job for ordinary soap and water. To dissolve the film that accumulates on insulator porcelain requires something pretty powerful, like tri-sodium phosphate, which is what is used in the St. Louis utility shop. The cleaning layout is shown in the accompanying sketch. The dirty insulators are laid carefully in wire baskets and lifted with a chain fall into a tank containing the hot "tsp" solution. After a thorough soaking the insulators are lifted out and one by one rinsed in water and scrubbed with the rotary brush. Then, clean and bright, they are packed into cartons and turned over to the stockkeeper.

•

Boulder Switches Use Standard Bearings

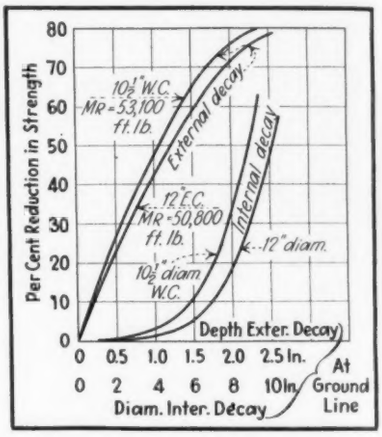
By C. N. BENSON
Electrical Division, SKF Industries, Inc.

Anti-friction bearings play an interesting part in the operation of the world's largest disconnect switches at Boulder Dam. In the twelve three-pole switches there are 428 ball bearings, totally inclosed and provided with force feed lubrication. Friction is so reduced in the switches that it is possible to actuate the 13-ft. blades of each switch with a ½-hp. motor controlled from the central dispatching board.

There are eight ball bearings in the motor operator, seven on each switch pole, two on each fractional horsepower motor and one on each control crank. Ball bearings on the motor operator are single row deep-groove bearings. Five of the anti-friction bearings on each of the switch poles are similar to the deep groove type with the addition of a single labyrinth inclosure as protection against dirt. The remaining two ball bearings on the switch pole are of the self-aligning type. Bearings on the electric motors are of the labyrinth type and on the control cranks the self-aligning ball type.

Pole-Strength Curve Shows Decay Effect

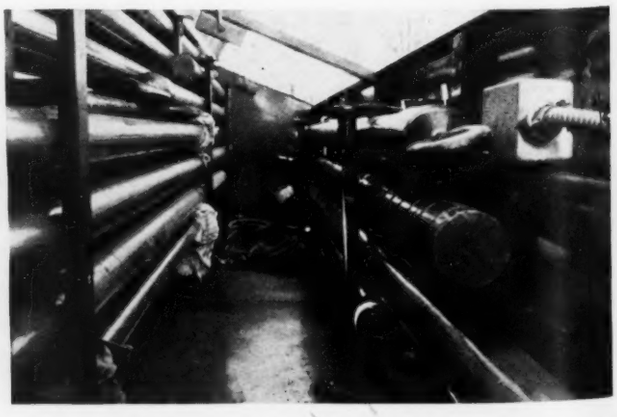
Effects of external and internal ground-line decay on the strength of wood poles is shown clearly by the accompanying curve, recently presented in the *Bulletin* of the Ontario Hydro-Electric Power Commission. This curve, drawn for a 12-in. diameter Eastern cedar and a 10½-in. Western cedar pole correlates the inches depth of external and internal decay with the per cent reduction in pole strength.



Decrease of strength of Eastern and Western cedar poles due to external and internal decay at ground line

The fact that the loss of heart wood does not have the same relative effect on pole strength as loss of sapwood is shown clearly by the curve. A 10-in. hole in a 12-in. Eastern cedar causes a reduction in strength of 47 per cent. This is about equivalent to 1 in. radial reduction in sapwood.

HOT-LINE TOOLS STORED IN TRAILER



This two-compartment trailer which carries TVA hot-line tools to and from the job is also used to store them when they are not in use. Permanent electric heaters mounted inside the trailer and supplied with power through outlets on the side of the trailer keep the tools dry while in storage. Note the felt and rubber covered supports on which the tools are mounted to avoid marring the insulating finish

Continuous service pays

THAT'S WHY THE TREND IS TO L-M RECLOSING FUSE CUTOUTS

L-M Type "RLD"
Open Type
Re-Closing Cutout
5000, 7500/12500, 15000 Volts
50 and 100 Amperes

L-M Type "RLO"
Open Type
Re-Closing Cutout
5000, 7500/12500, 15000 Volts
50 and 100 Amperes

L-M Type "RP"
Porcelain Housed
Re-Closing Cutout
5000 and 7500/12500 Volts
50 and 100 Amperes

Under today's loads service interruptions cost more than ever before. As this realization grows, more and more utility engineers are specifying L-M Re-Closing Fuse Cutouts...to prevent interruptions, and to insure dependable protection.

Compare These Features of L-M Re-Closing Fuse Cutouts

Fully Automatic Operation. The dropping action of the cartridge when the fuse link blows automatically transfers the circuit to the next adjacent fuse. Replacing the blown fuse link and returning the re-fused cartridge to its "up" position automatically restores the cutout to full operating sequence. There is nothing to "cock"... nothing the lineman must remember to do.

Bellows Time Delay. An ingenious trouble saver... this L-M Device insures a time lapse between opening and re-closing the circuit, allowing time to clear the fault, preventing needless blowing of the second fuse.

Firm, Sure Contacts. L-M Fuse Cartridges are positively latched in normal position. They cannot drop out of contact due to vibration. They are "up" till the fuse link blows.

Plain Indication. L-M Re-Closing Cutouts have only two positions... "up" position and dropout position. One glance tells where re-fusing is needed ...no confusing third or intermediate position.

Ask Your L-M Representative For Full Details On L-M Re-Closing Fuse Cutouts

LM

LINE MATERIAL CO.

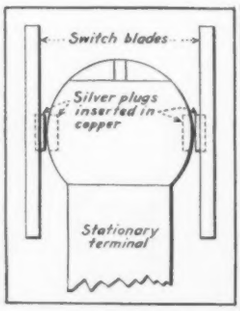
New ENGINEERING IDEAS

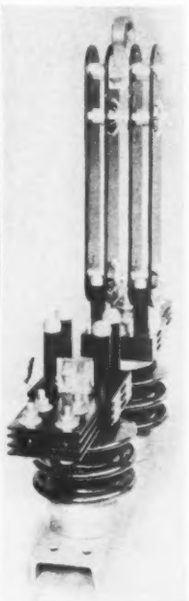
Discoveries, proposals and developments by electrical engineers and scientists in the field, the factory and the laboratory

Point Contacts for Heavy Currents

By W. H. LINDAE
Powercraft Corporation, St. Louis, Mo

Unit pressure and area are the determinants of resistance at a contact between two given electrical conductors. Resistance is inversely proportional to the product of these two factors. There are other values that enter the equation of contact resistance, but, roughly, the condition is as stated. Therefore, with total pressure remaining constant, the contact area may be reduced—and consequent unit pressure thus increased—without changing the resistance. By reducing the contact area to a very small value it becomes possible to use a metal of very high conductivity for the contact surfaces.





High-pressure silver contacts in this switch

This reasoning has led to the development of the new type of disconnecting switch which is shown in the accompanying illustration. The stationary contacts are spherical in form with silver plugs set into their sides. Silver plugs also are set into the blades so that the contacts in engagement are as shown in the detail sketch. Unit pressure at these contact surfaces is extremely high, although the total pressure is no more than is usual in any switch of usual design and of equal capacity. The point contact switch operates much more easily because the friction between contact surfaces is decreased.

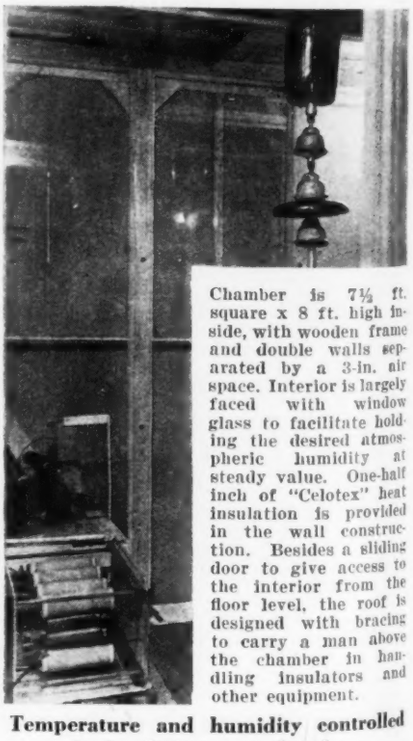
Tests on switches of this type have been made by commercial testing laboratories and amply prove the correctness of the design. For instance, in the test of a switch like the one illustrated, rated at 2,000 amp., 7,500 volts, runs were made with 2,000 amp. for six hours, 2,500 for $5\frac{1}{2}$ and 3,000 for $4\frac{1}{4}$ with alternating current, and in every case the highest observed temperatures were not in the switch, but in the bus leads to it. The maximum temperature rises in degrees Centigrade for the three runs were, respectively, 26, 29 and 40.

•

Control Atmosphere in Test Chamber

Flexible control of temperature and humidity values for testing insulation at the Harvard Graduate School of Engineering has been provided by a specially equipped chamber in its electrical engineering laboratories at Cambridge, Mass., under the direction of Prof. Chester L. Dawes.

Temperatures in this chamber may be varied from outside temperatures up to 100 deg. C. and the relative humidity from zero to 100 per cent. To provide humidity the chamber is equipped with a water tank 14 x 17 x 18 in. deep, having inlet and outlet ducts connecting with an air space above the water level. Air is forced through these ducts by an 8-in. electric fan on the outside and an immersion electric heating coil of 500 watts provides the desired water temperature. Wet and dry bulb thermometers are provided at the intake level. An open coil type heater, consisting of eight 300-watt units, is mounted on the chamber floor. Automatic thermostatic control of heating is furnished and all instrument and control wiring is metal-shielded.



Chamber is 7½ ft. square x 8 ft. high inside, with wooden frame and double walls separated by a 3-in. air space. Interior is largely faced with window glass to facilitate holding the desired atmospheric humidity at steady value. One-half inch of "Celotex" heat insulation is provided in the wall construction. Besides a sliding door to give access to the interior from the floor level, the roof is designed with bracing to carry a man above the chamber in handling insulators and other equipment.

Temperature and humidity controlled in insulation test chamber

FOR BETTER STREET AND HIGHWAY LIGHT-SERVICING

An internationally used ladder-rig that has the adaptability and tractability that assures economical, dependable, safe servicing—in short, better servicing. Speedily operated by one man and mountable on light trucks. Up-to-date equipment pays big dividends. Write for complete details.

METROPOLITAN DEVICE CORPORATION, BROOKLYN, N. Y.

MURRAY DEMOUNTABLE CROWSNEST

Industrial ELECTRIFICATION

New ideas and practices in industrial electrification as presented by industrial, consulting and power sales engineers

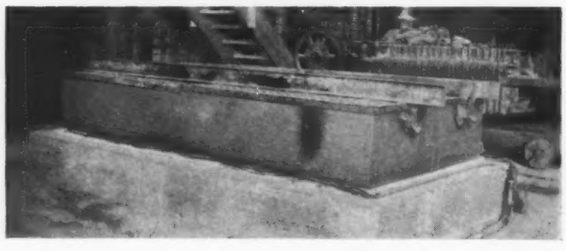
Electric Heat Saves Transportation Cost

By L. O. B. LINDSTROM
General Electric Company,
San Francisco, Calif.

On the surface there appears to be little relation between electric heat and freight rates, but a recent application of strip heaters at the plant of the General Metals Recovery Company, Tonopah, Nev., made a decided saving in transportation costs. In the cyanide process of gold recovery the precipitate comes off as a moist mixture of high water content. Formerly, this was shipped to smelters or electrolytic plants, where the dissolved gold is extracted.

Rather than pay the freight on excess moisture, the general practice has been to dry the precipitate in fuel-fired ovens, but this practice required the attention of a number of men, with attendant labor costs. However, investigation revealed that electric heat could be applied economically by means of the drying tank arrangement shown in the accompanying illustration. It consists of a large steel receptacle with double steel covers mounted on a concrete pad. Between the pad and the tank a separating layer of asbestos is placed so that sufficient space is provided along the sides of the tank to slip in twenty 1-kw. General Electric strip heaters. This arrangement provides for quick inspection and maintenance and sufficient air space for even distribution of the heat under the tank.

When the precipitate is placed in the tank (one charge may have as much as $7,000 worth of gold) the steel doors are closed down, padlocked shut and a heavy steel I-beam placed across the tank. Drying can thus go on without attention or fear of pilfering. When completed, the precipitate is in a caked form, which is shipped in bulk to the recovery center.



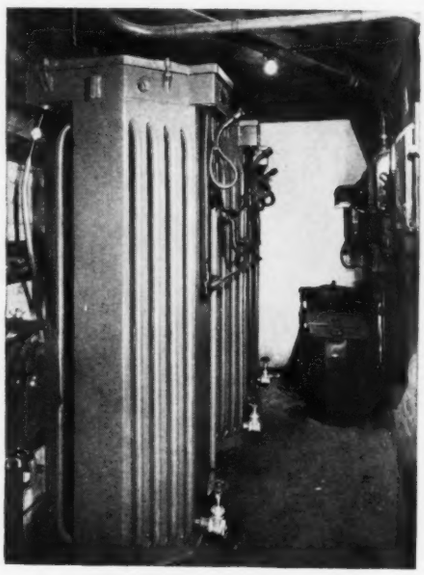
Precipitate drier uses electric strip heaters

By padlocking the cover shut the drying process can be carried on without attendance and the product can be transported at lower costs due to elimination of excess moisture.

•

Tall Transformers Save Rebuilding Cost

Seldom has the flexibility of modern electrical manufacturing methods been demonstrated more effectively than was done in meeting the requirements of the Golden West Brewery of Oakland, Calif. Upon analyzing a new power schedule of the Pacific Gas & Electric Company offering a rate for energy purchased at primary voltage which meant considerable savings, the management of the brewery decided to install its own transformer banks. While there was ample space within the electrical vault in the plant, investigation revealed that the equipment would have to be manhandled through a 32-in. passageway. Considering the fact that three 150-kva. transformers were required to supply the load, it appeared an impossible task to place the transformers in the vault without extensive alterations of the building walls, piping and electrical circuits.



Special 150-kva. transformers built to go through 32-in. passage save expensive rebuilding

The California Electric Co., Ltd., industrial electrical contractor of Oakland, took the problem to the Gardner Electrical Manufacturing Company, West Coast transformer manufacturer. The result is shown in the accompanying illustration. Three 150-kva., 6,900/11,950-volt Y to 230/460-volt transformers were built tall and narrow, permitting their entrance into the vault through the restricted passageway without difficulty. This service permitted the customer "to have his cake and eat it too" as he was able to take advantage of the new rate structure without incurring the penalty of expensive reconstruction.

Save with **ONE . . .**
Save more with **ALL**

A Survey of your plant will uncover costly corrosion and —where corrosion is the question these non-rusting COPPERWELD products are the answer.

STRAND • • • • • • • ☐ 1
3, 7, and 19 wire for:
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Copperweld and various combinations of Copperweld and Copper for:
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OVERHEAD GROUND WIRE • • ☐ 3
Permanent protection for the life of the line

GROUND RODS and CLAMPS • • ☐ 4
Reliable grounds are essential to effective protection

FENCE and BARBED WIRE • • • ☐ 5
Never needs painting—costs less per year

RAILROAD SIGNAL BONDS • • • ☐ 6
Jumpers and Track Circuit Connectors

MISCELLANEOUS • • • • ☐ 7
Anchor Rods . . . Nails and Staples . . . Wire for wrapping pipe lagging . . . Splicing Sleeves

In addition to the Copperweld products YOU are now using, there are others that can provide an equally profitable answer to your rusting problems. All Copperweld representatives have a broad engineering background and are thoroughly experienced in the profitable application of Copperweld products. Check the list at the left and if there are any of the items on which you would like more information, ask the Copperweld representative to tell you about them at the time of his next visit. Also, mail this coupon for detailed information.

Please send me detailed information on the following products.

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Name .....
Title .....
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COPPERWELD STEEL COMPANY
Glassport, Pa.
COPPER · BRONZE · COPPERWELD RODS, WIRE, AND STRAND

News ABOUT PEOPLE

R. Z. Zimmermann Assumes New Duties in Philadelphia

R. Z. Zimmermann has recently assumed the position of assistant to the vice-president in charge of operations of the Philadelphia Electric Company. Since March 27, 1929, Mr. Zimmermann had been vice-president in

charge of purchases, United Gas Improvement Company.

Mr. Zimmermann, a mechanical engineer, was connected with Day & Zimmermann, Inc., from 1916 to 1929, serving for a time as assistant to the vice-president in charge of public utility management. In 1922 he was appointed manager of the Salem (Ohio) Lighting Company. He became associated with U. G. I. when that company acquired a controlling interest in Day & Zimmermann in 1927.

JOHN H. HUBBS, purchasing agent of U. G. I., succeeded Mr. Zimmermann as head of the purchasing department.

•

▶ JAMES I. METCALF has resigned as administrative assistant with the New York State Power Authority, after nearly three years of service, over two of which were in the above executive authority. His plans include operating as an independent consultant on rates and marketing problems.

•

Col. A. C. Downey Appointed President of Airtemp, Inc.

Col. A. C. Downey, formerly president of the Fargo Motor Company, a division of the Chrysler Corporation, has been appointed president of Airtemp, Inc., the Chrysler subsidiary which manufactures air-conditioning equipment. Colonel Downey has been associated with the Chrysler organization since shortly after the war. In his new position he is responsible for engineering, manufacturing and sales of air-conditioning equipment.

•

▶ J. A. SLY has been appointed district manager of the Vancouver, Wash., district of the Northwestern Electric Company. He formerly held the position of district engineer.

JACK CLEMONS, newly appointed specialist for the Chicago area in all products of the General Electric home laundry equipment section, formerly with the Royal Eastern Electrical Supply Company, New York.

Porter Named Manager of New Niagara Hudson Division

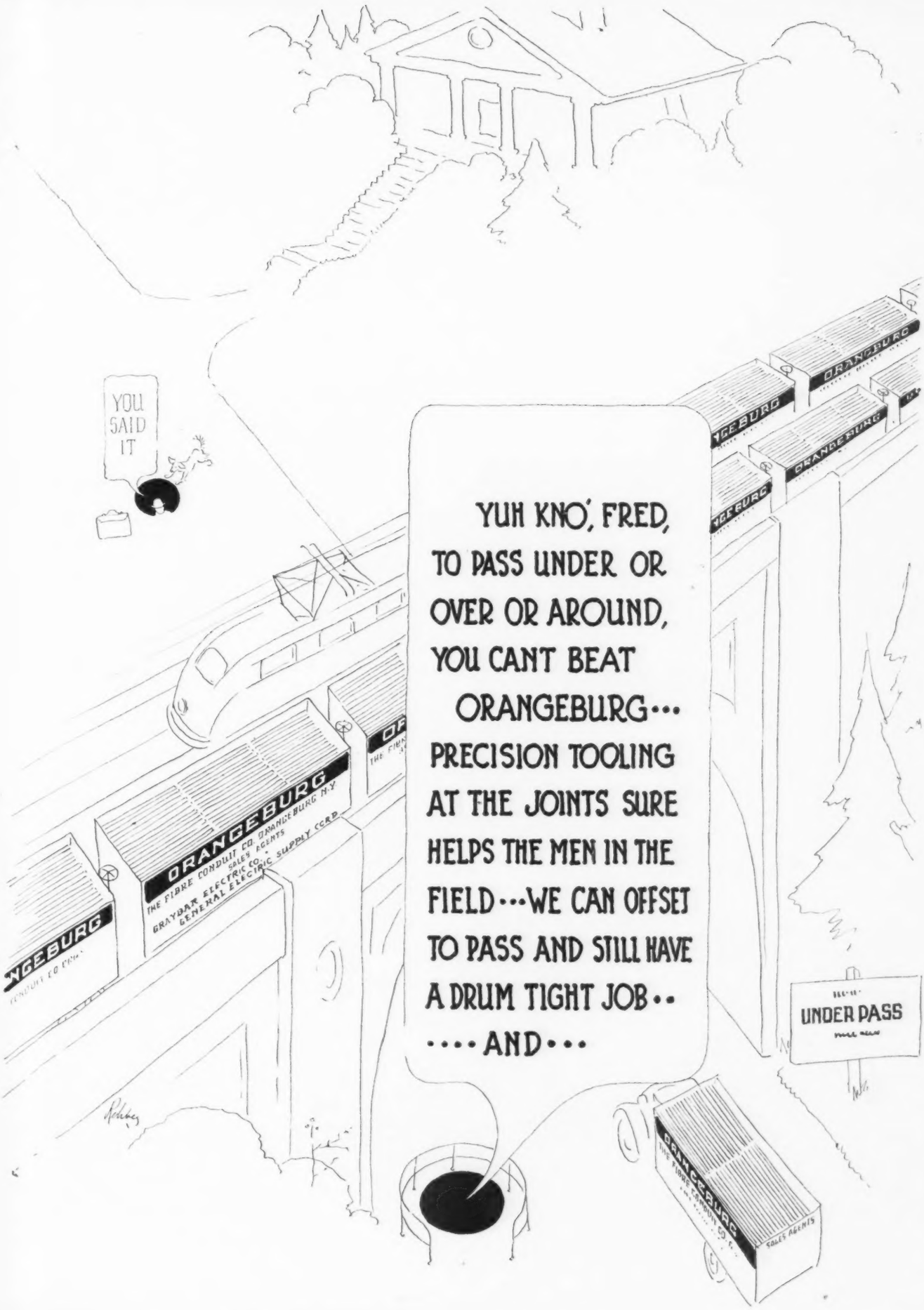
Ray W. Porter, president of the Peoples Gas & Electric Company, has been appointed executive manager of a new division of the Niagara-Hudson Power Corporation comprising the Watertown and Oswego, N. Y., districts, with headquarters in Watertown.

For the past seven years Mr Porter has been in charge of the Oswego district and was also president of the Fulton Fuel & Light Company. He was manager of the Fulton Light, Heat & Power Company prior to his connection in Oswego and is president of the Baldwinsville (N. Y.) Light & Heat Company.

The new division which he heads includes the utility companies in Oswego, Watertown, Fulton, Carthage, Baldwinsville and other villages, as well as a number of hydro-electric developments and power rights on streams likely to be developed. In Watertown, he succeeds THOMAS N. MCCARTER, JR., president of the Northern New York Utilities Company, who resigned to accept a position with the Public Service Corporation of New Jersey.

•

▶ D. L. WISHON, for 43 years active in the electrical industry in the San Joaquin Valley, retired July 1 from managership of the Bakersfield district, San Joaquin Light & Power Corporation. He was succeeded by Harold K. Fox, for the past thirteen years in charge of hydro-electric construction. Mr. Wishon joined the Mt. Whitney Power Company at Visalia in 1894, joined the San Joaquin company in 1902, and in 1918 was named manager of the Bakersfield district. He is a brother of the late A. G. Wishon and an uncle of A. Emory Wishon,


YOU SAID IT
YUH KNO', FRED, TO PASS UNDER OR OVER OR AROUND, YOU CANT BEAT ORANGEBURG··· PRECISION TOOLING AT THE JOINTS SURE HELPS THE MEN IN THE FIELD···WE CAN OFFSET TO PASS AND STILL HAVE A DRUM TIGHT JOB·· ···· AND···
ORANGEBURG
THE FIBRE CONDUIT CO. ORANGEBURG, N.Y.
SALES AGENTS
GRAYBAR ELECTRIC CO.
GENERAL ELECTRIC SUPPLY CORP.
UNDER PASS

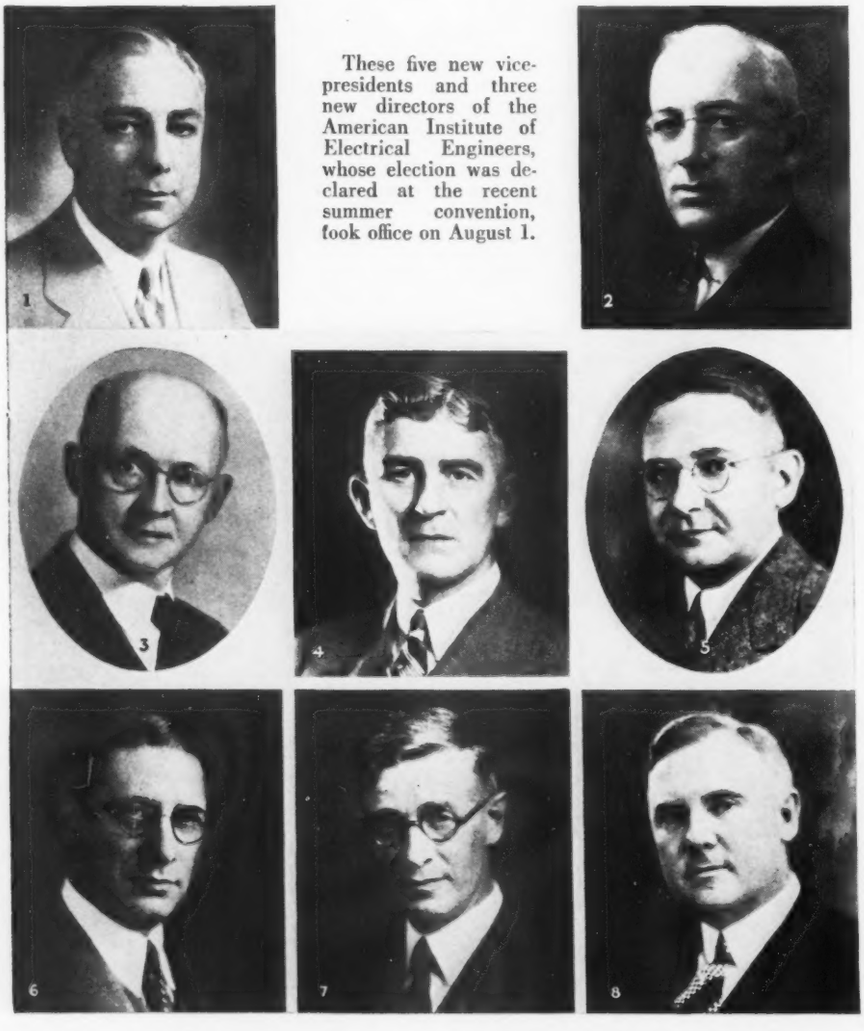
president of the company. Mr. Fox joined the organization in 1919 during construction of Kerckhoff Dam.

▶ H. B. ALLEN, who for fourteen years was New York district sales manager of the Babcock & Wilcox Tube Company, has resigned from that company to become vice-president of John B. Astell & Company, New York, distributor in the Metropolitan district of B&W seamless carbon steel boiler tubes and alloy tubes and a wide variety of other tubular products, including all kinds of welding fittings.

▶ WALTER C. STAEFFLER, assistant secretary of the Manitowoc Public Utilities Commission, was elected president of the Wisconsin Municipal Utilities Association at the final session of its ninth annual convention in Manitowoc. He succeeds Martin Lyon of Clintonville. Other officers elected were E. S. CARY, superintendent of the Evansville utility plant, vice-president; JOHN JEDWABNY; Menasha, secretary-treasurer.

▶ E. C. THOMPSON, formerly supervisor of transmission for the Alabama Power Company, has joined the Ohio Brass Company as sales engineer in the power utilities department with headquarters in Mansfield. Mr. Thompson was engaged in transmission engineering with the Alabama Power Company for 12 years.

Newly Elected Officers of the A.I.E.E.



These five new vice-presidents and three new directors of the American Institute of Electrical Engineers, whose election was declared at the recent summer convention, took office on August 1.

New vice-presidents are: (1) L. N. McClellan, chief electrical engineer, U. S. Bureau of Reclamation, Denver; (2) Edwin D. Wood, general superintendent, Louisville Gas & Electric Company; (3) J. P. Jollyman, hydro-electric and transmission engineer, Pacific Gas & Electric Company; (4) M. J. McHenry, manager, Toronto district, Canadian General Electric Company; (5) I. Melville Stein, director of research, Leeds & Northrup Company. New directors are: (6) C. R. Beardsley, general superintendent of distribution construction, Brooklyn Edison Company, Inc.; (7) Vannevar Bush, vice-president and dean of engineering, Massachusetts Institute of Technology; (8) F. H. Lane, manager, engineering division, Public Utility Engineering & Service Corp.

▶ L. J. BERBERICH has recently resigned as research engineer in charge of cable- and capacitor-oil development for the Socony-Vacuum Oil Company, Inc., Paulsboro, N. J., to become a research engineer in the insulation division of the research laboratories of the Westinghouse Electric & Manufacturing Company, East Pittsburgh. Dr. Berberich is a member of the National Research Council's committee on insulation and the American Society of Testing Material committee D-9 on electrical insulating materials. He is a member of the American Association for the Advancement of Science.

▶ FRED S. HUNT, Milwaukee, has been elected chairman of the Wisconsin Publice Service Commission until March, 1939, when his present term expires. WILLIAM M. DINEEN continues as chairman of the commission.

▶ HARRY ALTER has been elected president, sales manager and director of the General Household Utilities Company. He will succeed William C. Grunow, who was elected to the newly created post of chairman of the board.

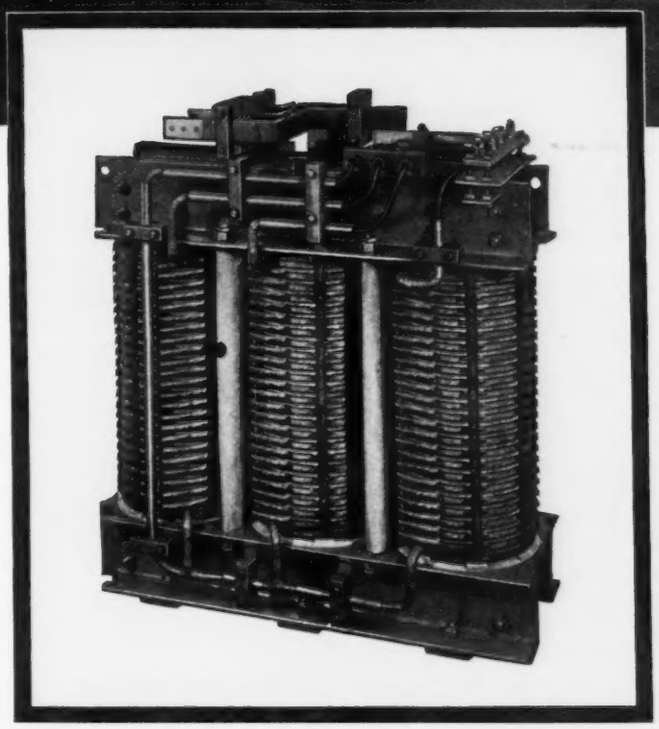
▶ T. E. HUGHES, chief maintenance engineer of the Duquesne plant of the Carnegie-Illinois Steel Corporation, has been elected chairman of the Pittsburgh district of the Association of Iron and Steel Engineers, for the season August 1, 1937 to July 31, 1938. Mr. Hughes' entire business background has been identified with the steel industry.

OBITUARY

▶ MONROE GUETT, vice-president and a director of the Arrow-Hart & Hegeman Electric Company, Hartford, died at his home in Hartford on July 18. He began with the Hegeman Electric Company in Kansas City, Mo., in 1891, coming to Hartford in 1892. Mr. Guett was elected vice-president of Hart & Hegeman Company in 1925, continuing in that office when the company was merged with the Arrow Electric Company in 1929. He had 200 patents to his credit, all for electrical devices.

▶ GEORGE W. WISER, 71, who had been an electrical and mechanical engineer with the Birmingham Electric Company for twenty years, died at his home in Birmingham on July 15.

THESE MACHINES GUARANTEE *Better* NETWORK TRANSFORMERS



This improved coil construction is but one of the features which have established Allis-Chalmers Network Transformers as the most reliable available on the market today.

MOST failures of network transformers are occasioned by breakdown between turns. To prevent this Allis-Chalmers, some years ago, introduced a radical change in the method of manufacturing coils for this type of transformer. The conductors are insulated with spirally wound, over-lapped cable paper, over which is superimposed a protective covering of woven cotton tape. The coils themselves are manufactured on the special machines shown above which are so designed that they will wind twin disc coils automatically without a spliced connection on the inside of the coil stack.

Ask the nearest Allis-Chalmers representative for a copy of bulletin 1184 which describes in detail these advanced transformers.

795

TRANSFORMER DIVISION

ALLIS-CHALMERS

MILWAUKEE WISCONSIN

New EQUIPMENT AVAILABLE

Non-Tamperable Fuse

Non-tamperable plug fuse line in two ranges (non-interchangeable) listed by Underwriters' Laboratories is announced, requiring no changes in existing standards for cut-out bases. Adapters lock into present standard bases. As the fuses have standard Edison screw shells, they can be used without adapters when desired, in present standard cut-out bases. This eliminates need of carry two types of plug fuses, it is claimed. Furnished with time-delay for motor circuits when desired.

Fuses made in 0 to 15-amp. and 16 to 30-amp. ranges; all interchangeable in own range, not with fuses in other range. No concealed contacts, new contact surface provided every time new fuse inserted. Marketed by **Chase-Shawmut Co.**, Newburyport, Mass.

•

Variable-Speed Transmission

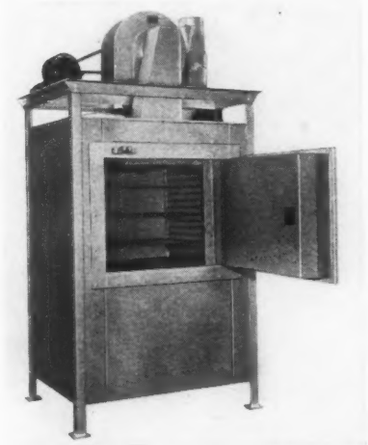
A hardened steel roller in pressure contact with an equally hardened steel driving disk is used in this variable-speed transmission to transmit power through two gears to the output shaft. An automatic loading device is employed to maintain the pressure of the roller against the disk in direct proportion to the load put on the output shaft, and thus to maintain a constant output speed. The dial at the top of the unit indicates the running speed of the output shaft and may be set to predetermined speeds within the unit's limits at any time during its operation, as well as before starting, it is said.

Motorized unit; sizes from ¼ to 5 hp.; reduction ratios, about 8 to 1 at low speeds and 22/5 at high speed; 1,150 or 1,750 r.p.m., 220-440 volt, three-phase a.c. motor on sizes over ½ hp. **The Lenney Machine & Mfg. Co.**, Warren, Ohio.

•

Air-Drawing Furnaces

In these air-drawing furnaces heat generated within the chamber below the charge is drawn up through the side air passages into the fan and delivered at high velocity down through the work, from where it recirculates back through the fan. The small temperature differential between developed and operating heat is said to assure economy of operation and ready response to control, with no overshooting. Suggested applications include drawing, tempering, bluing, annealing and other heat treating of ferrous or non-ferrous metals.



"General Air Draw;" for temperature ranges from 450 to 1,100 deg. F.; gas or electrical heating units; fan motor, 220-440 volts, three phase. **General Combustion Corp.**, Chicago.

•

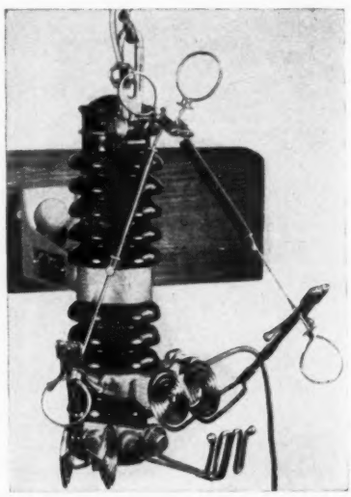
Automatic Pulleys

"Hi-Lo" pulleys; for use with constant-speed motors from 1/4 to 3 hp. **Equipment Engineering Co.**, Minneapolis.

Bakelite replaces gray iron casting for pulley faces in these automatic pulleys, to prevent pitting caused by static electricity (built up by the belt drive) arcing between the pulley parts. Pulleys are designed to provide infinitely variable speed with constant-speed motors and standard V-belts and are said to maintain constant speed regardless of load variations and to regulate automatically the belt tension to the load.

Fuse Switch

A new automatic reclosing type fuse switch is designed to provide rural line customers and operators with service protection equivalent to that offered metropolitan circuits. Optional pole or crossarm and transformer mountings are available for these "two-shot" repeater fuse switches. Principles of design of the company's "Trip-O-Link" fuse switches are used in this new type.

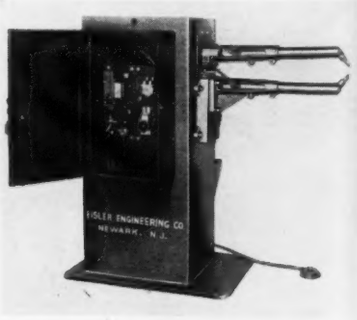


"Trip-O-Link Trip-Saver;" 5,000 and 7,500/12,500 Y volts, 25 amps. **James R. Kearney Corp.**, St. Louis.

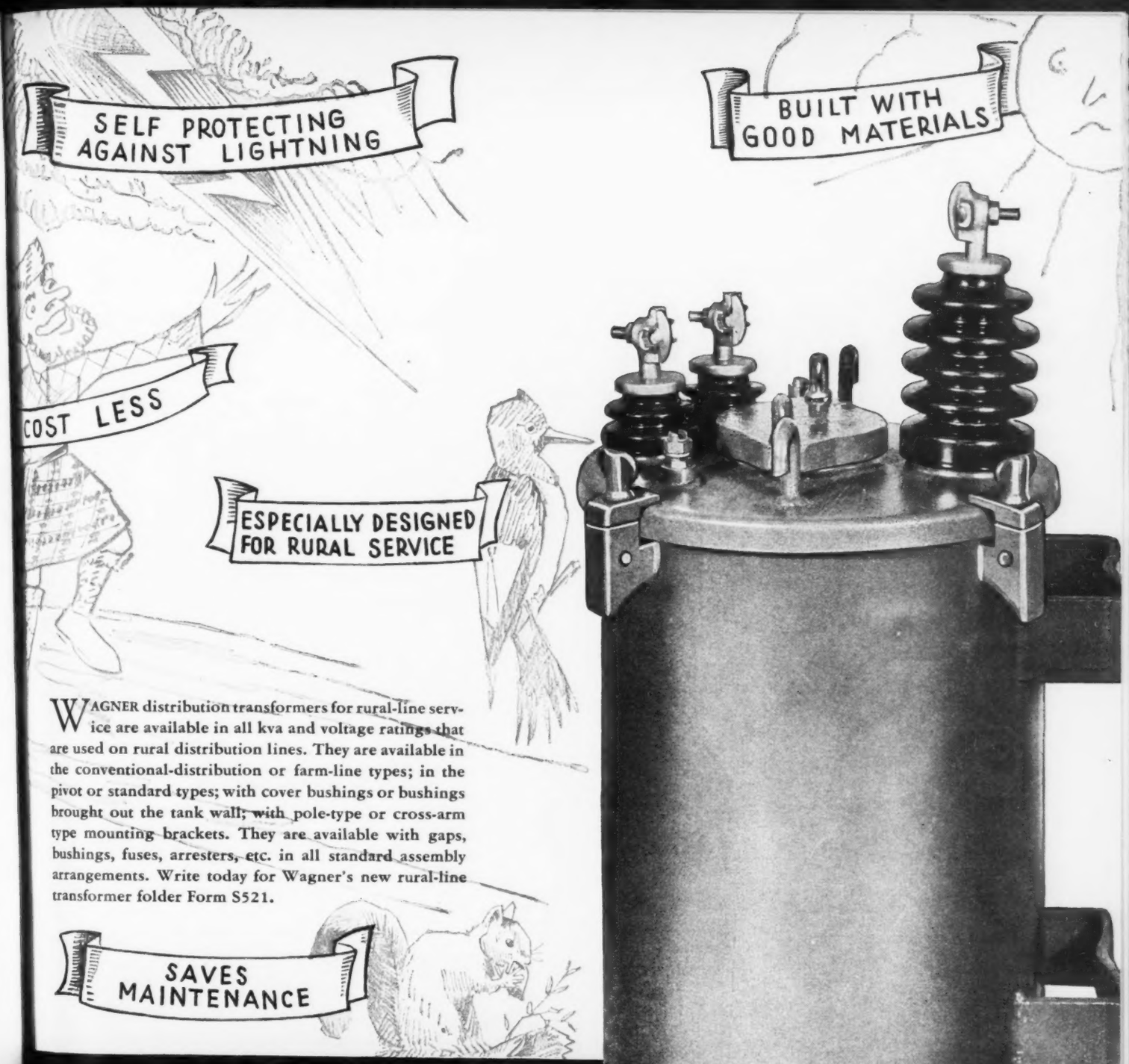
•

Resistance Welder

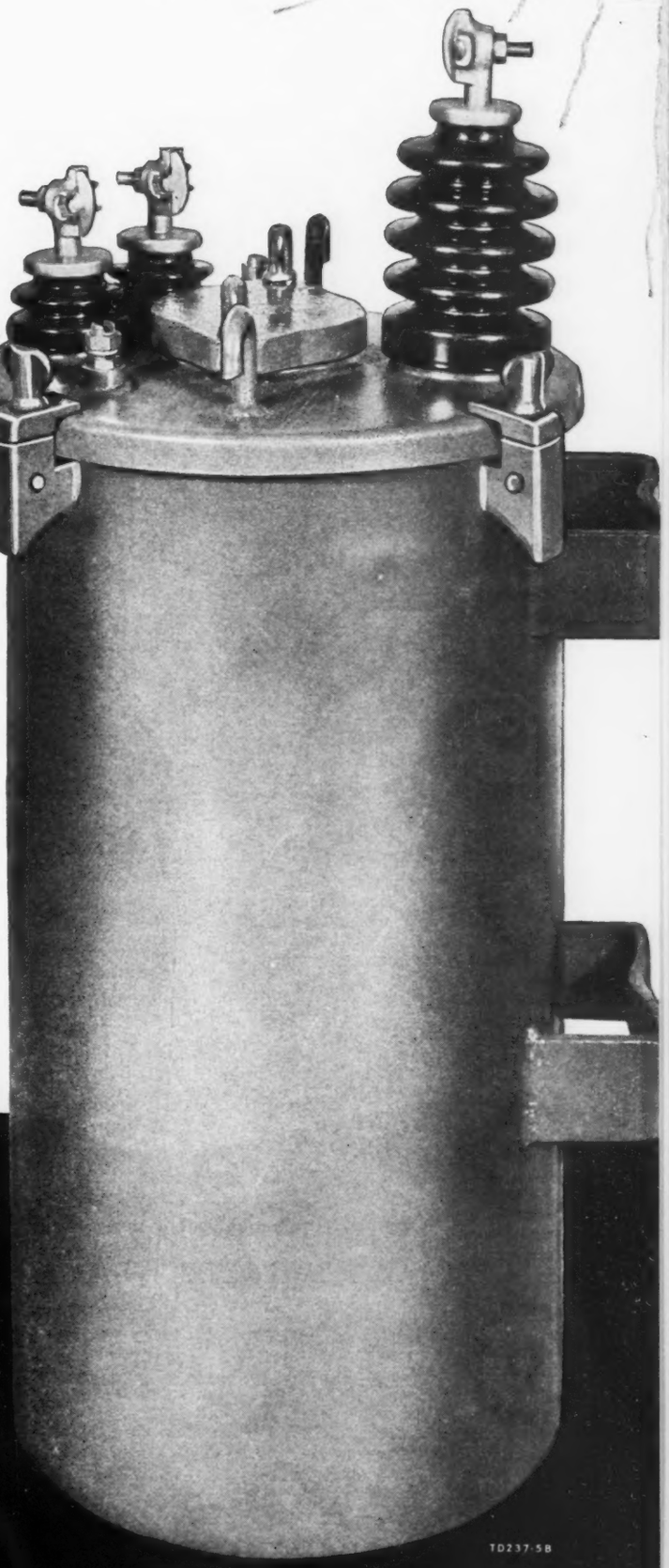
Welds on this air-operated spot welder are controlled by means of a solenoid starter. By depressing the starter the solenoid actuates the air cylinder, which in turn closes the electrodes on the work. Duration of the



Capable of making 100 spots per minute; eight-point hand wheel regulates heat; arms can be supplied from 36 to 48 in. **Eisler Engineering Co., Inc.**, Newark, N. J.



WAGNER distribution transformers for rural-line service are available in all kva and voltage ratings that are used on rural distribution lines. They are available in the conventional-distribution or farm-line types; in the pivot or standard types; with cover bushings or bushings brought out the tank wall; with pole-type or cross-arm type mounting brackets. They are available with gaps, bushings, fuses, arresters, etc. in all standard assembly arrangements. Write today for Wagner's new rural-line transformer folder Form S521.



Wagner

Rural-Line Transformers

Wagner Electric Corporation

6400 Plymouth Avenue, Saint Louis, U.S.A.

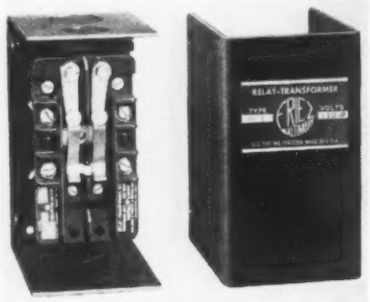
TORS • TRANSFORMERS • FANS • BRAKE

welding period is regulated by the automatic timer and contactor on the side of the fabricated frame. Timer is adjustable to regulate current from 2 to 60 cycles in 110 divisions. Air-pressure valve regulates pressure between 35 and 60 lb., depending on the type of work. Interchangeable arms on welder facilitate variation in type of work.

•

Relay-Transformer Sets

The transformers in these transformer-relay sets are built into the relays themselves; the same coils operating the relay proper also produce the low-voltage (20 volts) supply. Thus the electrical load to



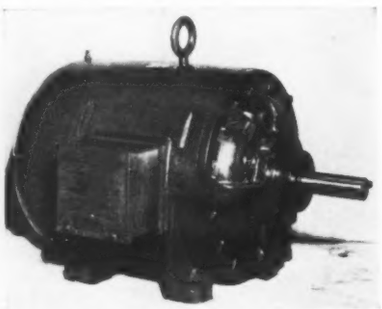
Sizes for handling loads up to ¾ hp. or 1,000 watts; 110 or 220 volts, 50-60 cycles. **Julien P. Friez & Sons, Inc.,** Baltimore.

be handled remains on line voltage, while the control instrument—thermostat, humidistat or effective temperature control—is at the same time placed on low voltage. This is said to lower the cost and ease of installation, yet give added control, instrument sensitivity and reliability.

•

Fan Cooled Motors

New dual ventilated fan-cooled type CS squirrel-cage motors are designed for use in automobile factories, foundries, machine shops, cement plants and similar installations where severe service is required, and may be installed outdoors without additional



Westinghouse Electric & Manufacturing Co., East Pittsburgh.

protection, it is claimed. Motor frame contains two separated sets of air ducts. Internal fan on the rotor circulates warm air through the inner ducts, the walls of which are cooled by the external fan blowing larger volumes of cool air through the external ducts.

•

A.C. Arc Welders

Through a special circuit and control, designated "Synchro-Control," both welding current and voltage for these a.c. arc welders are said to be controlled in a manner comparable to successful d.c. motor-generator

"ACE" a.c. arc welders; Model 10, 15 to 150 amp.; Model 20, 15 to 250 amp.; for use with from 1/16 to 1/4-in. rod; 220 or 440 volts, 60 cycles. **Pier Equipment Mfg. Co.,** Benton Harbor, Mich.

sets. Welders incorporate a specially designed transformer with reactance and employ a circuit said to provide a stable, non-blasting arc without spatter loss. They are suggested for use for fillet, horizontal, vertical or overhead welding on iron castings and steel from 22 gage up. Efficiency of more than 90 per cent at full load is claimed.

•

Air Circulator

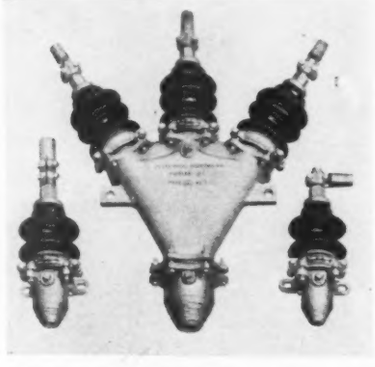
Type HV1D, arranged for exhaust applications; one and two-speed models, pedestal and tripod mountings also offered. **General Electric Co.,** Schenectady.

A new air circulator for offices, restaurants and other places of business as well as for home use consists of a ⅛-hp. motor mounted on a resilient base and directly connected to a three-bladed, 19½-in. diameter, aphonic axial flow fan, protected by a welded steel wire guard. Tests on the fan, feature of the circulator, indicate that it will move a greater volume of air, more quietly, at a given delivery pressure and power input, than other fans of similar type and size, it is claimed.

•

Cable Terminator

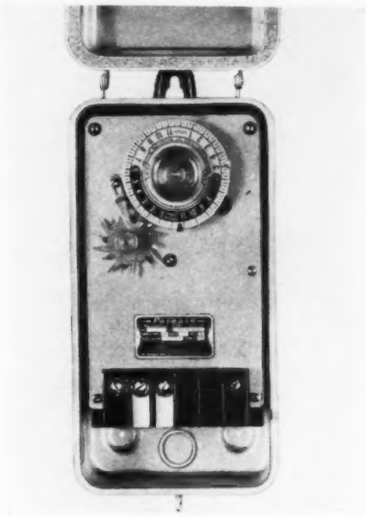
These interchangeable bushing cable terminators are designed to insure vacuum tightness under extreme conditions. The stud connectors are made from hexagonal, hard-drawn copper rod; seating shoulders, built-up of laminated spring bronze slotted washers, engage recesses in the hexagonal portion. When cap nut is tightened the laminations flex and press the hood nut gasket, compensating for temperature changes and gasket aging.



Made for voltages from 7.5 to 30 kv. **Delta-Star Electric Co.,** Chicago.

Time Switch

New synchronous time switches are said to be adaptable to both indoor and outdoor installation because of their dust-tight, moisture-tight and tamper-proof cases. A new "clear-line" dial and trip assembly is said to be their second new feature. One



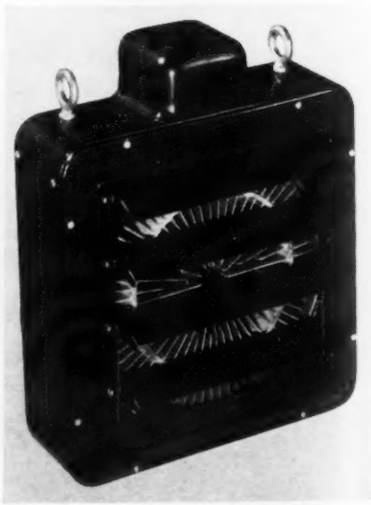
One of two models offered. **Paragon Electric Co., Chicago.**

of the two dial knobs frees or locks the dial to a frictionless arbor. The other dial knob frees or locks the adjustable switch trippers, which are so attached that they cannot loosen or get lost.

•

Industrial Heater

A single, cast-aluminum, circular grid, poured around a Calrod heating element; a cast aluminum fan housing and a stronger housing construction are described as the new features of this industrial heater. Motor-driven, four-blade aluminum fan, running on



"Electromode," Model IBN. **The American Foundry Equipment Co.,** Mishawaka, Ind.

graphite-impregnated bronze bushing for quiet operation, dissipates heat from the surface of the grid and circulates the warm air; heat may be directed as desired by adjustable deflectors on front of the unit. Thermal safety switch is said to prevent damage to grid from overheating; unit is also obtainable with thermostatic control.

1937 EDITION

Detailed Data on The Light and Power Industry *at Your Finger Tips*

McGRAW CENTRAL STATION DIRECTORY

CONTENTS

Names and addresses of independently owned electric light and power companies in the United States, Canada and United States Possessions.

Names and addresses of municipally owned electric light and power systems in the United States, Canada and United States Possessions.

Names and addresses of affiliated, holding, controlling or managing companies with complete lists of properties controlled or managed by each.

Names and addresses of principal officials of holding and managing companies.

Names and addresses of officials and chief operating men for all operating companies including:

Presidents
Vice Presidents
General Managers
Chief Engineers
Electrical Engineers
Mechanical Engineers
General Superintendents
Plant Superintendents
Plant Engineers
Superintendents of Distribution
Superintendents of Transmission
Commercial or New Business Managers
Merchandising Managers
Purchasing Agents
Division or District Managers
Division or District Superintendents
Division Merchandising Managers

For each operating company the following information is presented:

Generator Capacity in kva. or kw.
Kind of Prime Mover and Capacity in hp.
Amount of power purchased in kw.-hrs.
Type of current distributed, number of wires, phase and cycles.
Number of meters served.
Location of power plants.
Location of districts or divisions.
Complete list of towns (having a population of 500 and over) served.

National and State Public Utility Commissions with addresses, names of commissioners and principal assistants.

A complete alphabetical index of companies and municipal systems giving location by city and state.

All the information you need to intelligently contact this field

READY NOW

The McGraw Central Station Directory gives complete information on the organized agencies which furnish electric light and power service to communities of 500 or greater population in the United States, Canada and United States Possessions.

It lists all operating and holding companies, arranged alphabetically according to cities and states, together with the names and titles of operating officials and other executives, names of the cities served by each company, capacity and location of plants, amount of power purchased, type of current distributed, number of meters served.

National and State Commissions are also listed, together with their commissioners and principal assistants.

More than 800 pages—handy size—4½" x 8½"—printed in clear readable type—bound in flexible covers that resist hardest usage — fully thumb-indexed by states. Price $25.00 per copy with 10% discount on orders for 5 copies or more.

McGRAW-HILL PUBLISHING CO., INC.
Catalog and Directory Division
330 West 42d Street, New York, N. Y.

Manufacturing AND MARKETS

Electrical Exports Show May Increase

Exports of generators, steam turbo-generator sets and accessories during May totaled $147,707, compared with $205,914 a year ago, according to the Department of Commerce. Self-contained lighting sets were valued at $132,659, as against $63,384; double current and motor-generators and convertors $41,585, against $53,617.

Exports of transformers came to $179,140 as against $201,359; electric furnaces $73,928, against $68,689; electrodes, $269,592, against $231,845; motors and accessories $384,493, against $313,392; rubber-covered wire, $163,726, against $111,383; weatherproof $27,300, against $33,965; other insulated copper wire $102,461, against $82,198; meters $79,226, against $36,571.

Exports of electric railway motors and equipment totaled $283,473, against $230,301; indicating and recording instruments $114,406, against $61,059.

•

General Electric to Spend $100,000 on Radio Stations

General Electric's short-wave stations W2XAD and W2XAF will become the strongest in America and probably in the world, the company states, upon completion of a new 100-kw. transmitter, permission for the erection of which has been granted by the Federal Communications Commission.

The new equipment will involve a cost of more than $100,000 and will increase the signals to more than twice their present strength.

•

Roebling's Takes Fair Space

For its exhibit at the New York World's Fair of 1939 the John A. Roebling's Sons Company has contracted for 1,575 sq.ft. in the Halls of Production at a cost of $20,286, according to an announcement by Grover A. Whalen, president of the fair. The exhibit will feature the different types of wire rope, insulated wire and cable, flat wires, wire screening and netting and welding wire, in addition to great suspension bridges.

•

Manufacturers Make Sales Assignments

Included among the sales assignments recently announced by electrical manufacturing companies are these:

G. W. Hoskins, recently with the Lincoln Electric Company, has joined the Harnischfeger Corporation of Milwaukee as sales engineer for "Smootharc" welder and welding rods in the Philadelphia territory. Dave Wilkus has been appointed sales engineer for this company's line of slip-ring and squirrel-cage motors and will represent the company in Chicago.

H. R. Kimball, 176 Federal Street, Boston, has been appointed by the Roller-Smith Company of New York as its district sales agent for New England.

Charles L. Stroup has been appointed district sales manager for the Jeffery-Dewitt Insulator Company's office at 100 West Monroe Street, Chicago.

Simeon Jester, Jr., formerly with the sales department of the Philadelphia office of the American Engineering Company, has been transferred to the Chicago office.

Caterpillar Tractor Company has promoted C. M. Burdette to manager of the central sales division. Charles A. Spears has been advanced to manager of allied equipment sales. Merwin T. Farley, eastern agricultural sales supervisor, has been made agricultural sales manager of the eastern division and Floyd E. Rusher, agricultural sales manager of the eastern division, has been promoted to assistant sales manager of the central division, succeeding Mr. Burdette.

Ward Leonard Electric Company announces the appointment of the Triangle Equipment Company of New York and Chicago as their representatives for the sale of Ward Leonard motor starters, controllers, contractors and disconnect switches. The New York office under the management of R. B. Anderson will cover the metropolitan area and New Jersey. The Chicago office under the management of R. W. Anderson covers Wisconsin, eastern Iowa, Illinois and northern Indiana.

Gain in Orders Shown by Worthington Pump

Unfilled orders of Worthington Pump & Machinery Corporation on July 1 were 81 per cent greater than on the same date last year, and were at the highest level in seventeen years, H. C. Beaver, president, has announced. As a result, he said, "the principal plants of the corporation at Harrison and Newark, N. J., and at Buffalo, N. Y., are operating at a high percentage of capacity, and the corporation's Holyoke, Mass., plant, which was recently reopened, is rapidly expanding production. Many lines of industry served by the company contributed to the increase in orders."

Worthington Pump & Manufacturing Corporation has been awarded a contract by the New York City Department of Sanitation for pumps and gas engines for the Tallman's Island sewage treatment works, totaling $469,000.

The contract calls for four centrifugal pumps, two with a daily capacity of 15,000,000 gal. each and two of 35,000,000 gal. each. The company will also furnish eight gas engines ranging from 180 to 800 hp.

•

Nash-Kelvinator Obtains Control of Electromaster

A controlling interest in Electromaster, Inc., manufacturer of electric ranges and water heaters, has been acquired by the Nash-Kelvinator Corporation.

Nash-Kelvinator through exercise of an option of 50,040 shares of unissued capital stock, purchase of 26,591 shares from a stockholder and purchase of convertible income notes, which were exchanged for 31,292 shares more, obtained 55.27 per cent control of Electromaster.

No change in the management or policies of Electromaster will be made, according to George W. Mason, president of Nash-Kelvinator Corporation. "Electromaster will continue to promote its own business of making and distributing nationally the Electromaster line of ranges and water heaters," Mr. Mason said. In addition, it will continue to manufacture electric ranges for Kelvinator. Nash-Kelvinator will be represented by two directors on Electromaster's board of seven.

•

Electrical Employment Gains

Employment in the electrical machinery industry in Maryland during June was 69 per cent higher than a year ago and 4.1 per cent above May, 1937, according to reports of the State Commissioner of Labor and Statistics. Combined payrolls were 81.1 per cent higher in June than a year ago and 1.1 per cent higher than in May, 1937.

•

Secures $25,000 Cable Award

General Cable Corporation, New York, N. Y., has secured a contract from the Los Angeles Water and Power Commission, Los Angeles, Calif., for 20,000 ft. of No. 2/0 cable, and 8,500 ft. of No. 6 insulated low-voltage cable, at $25,090.

•

Gets Transformer Contract

The Pennsylvania Transformer Company, Pittsburgh, has been awarded a contract by the Los Angeles Water and Power Commission for 22 distribution station transformers on its bid of $184,840. Units will be of single-phase, 60-cycle, oil-immersed, self-cooled, outdoor type.

•

Australia Receives Bids

State Electricity Commission, Melbourne, Victoria, Australia, receives bids until October 12 for quantity of 6,600-volt compound-filled switchgear, with complete accessories.

New York Metal Prices

	July 21, 1937 Cents per Pound	July 29, 1937 Cents per Pound
Copper electrolytic	14.00*	14.00*
Lead Am. S. & R. price	6.00	6.00
Antimony	15.00	15.25
Nickel ingot	35.00	35.00
Zinc spot	7.35	7.35
Tin Straits	60.25	59.125
Aluminum, 99 per cent	20–21	20–21

*Delivered Connecticut Valley.

Field Reports on Business

Demands for electrical equipment continues in good volume, leading to the opinion that fall trade will show a substantial increase over a year ago. Sales of electrical appliances are holding up well. Rural electrification is running ahead of early estimates.

PACIFIC COAST

San Francisco, which may be taken as typical of the region, even though somewhat hampered by labor unrest, reports 15 per cent payroll increase over last year and increases of 7 per cent employment and 15 per cent in tourist traffic. Uncertainty over PWA funds has imperiled construction at Salem and elsewhere, though Roosevelt water district of Arizona has applied for aid in $2,500,000 hydro-plant and necessary equipment for 7,000-kva. project near Phoenix. Other transmission lines planned include a $140,000 contract for 125 miles in Pinal and Gila counties, Arizona; 54 miles of REA lines in Clatsop County, Oregon, and 103 miles of REA lines in Bonner County, Idaho.

Large public construction scheduled includes $2,000,000 for Los Angeles working post office, a coast guard flying field near San Francisco, a fleet air base at Reeves Field near Los Angeles and a $1,000,000 state department of standards building at Sacramento. The $7,000,000 army base at Sacramento will be completed late next year, recent contracts having totaled $450,000 for such buildings as hospital, post exchange and the like. Sub-contracts have been awarded for main construction on Los Angeles $6,000,000 Union depot, previous work having covered express offices, yard work and miscellaneous electrical installations.

Few specific orders for heavy machinery have been reported for a fortnight, but manufacturers report a very fair volume for stock sizes of motors and transformers, with local plants still running to capacity. The outstanding industrial item is the $5,000,000 oil refinery planned by Richfield.

NEW ENGLAND

Motor sales are steady; one prominent manufacturer reports some difficulty in meeting the demands for prompt delivery of small motors; buying by textile interests is quite active. During the past week industrial equipment sales for one company were 50 per cent ahead of July, 1936.

Central station supplies are spotty; one company records buying of distribution transformers on a fairly large scale for eastern Massachusetts; line materials are quiet and new construction supplies for domestic needs are steady. Arc welder units are in active demand; one manufacturer notes an encouraging tendency on the part of small shops and garages to install arc welders due in part to the almost universal trend toward welded rather than rivited joints in a very wide scale. Recent orders of interest include two sizable groups of 150- and 200-amp. units for a Connecticut shipyard, also two 300-amp. units for a prominent contractor and several small portable types for eastern Massachusetts shops. Interior electric lighting is moving ahead. Fan sales during the past week have practically depleted the supply in this area.

Merchandising is unusually strong for this season. In a recent four-month campaign Brockton Edison sold 2,568 large household appliances, a gain of 338 over last year's comparable drive. In the best week 67 electric ranges were sold. In eastern Massachusetts store merchandising is reported over 25 per cent ahead of last year for major electric appliances. Considerable electric cooking equipment is being considered for new institutions and schools in this area.

NEW YORK

Business in this section is experiencing the lull between the summer and fall trade. While the sales volume in most lines is above a year ago it has not reached earlier estimates. Reports, however, indicate that there is a growing tendency toward a pickup which should assume good proportions before early fall.

The high cost of building materials has caused a drop in the volume of new construction, especially residential building. Efforts are being directed toward a downward adjustment in costs in order to stimulate renewed building. Electrical contractors and merchandise makers see in this trend prospects of good trade once the movement gets under way again.

Many electric utilities are running ahead in their rural electrification programs, with miles of line built exceeding early estimates. Methods of raising additional capital for utility plant construction are still a source of worry to the industry. Opinions are being expressed in many quarters that soon the utilities will be forced to install, on a large scale, additional generating equipment to meet the rising demand for energy.

Appliance sales continue to hold up well, with refrigerators and small appliances dominating the markets. Electric fans have been in great demand during the recent hot spell.

CHICAGO

The demand for electrical equipment continues at a steady pace and reports from the industry indicate an increasing amount of confidence that the volume of business will be substantially higher in the fall. More optimism prevails each week as many factors give evidence that the trend of business is upward. The utilities are enjoying increased earnings and manufacturers report sales holding up very well. Industrial activity showed a little more life last week and prospects for farm income remained favorable with prices generally holding at relatively high levels.

The one phase of activity causing concern in this section is building. The rapidly increasing prices struck a severe blow to the hopes of a large volume of residential construction, with the result that the showing has been anything but gratifying.

Electric appliances are reported selling in good volume. The interest shown in air conditioning is especially good. Small motors are in demand and control equipment sales are steady. Several large orders for store-lighting equipment are reported. Central station supplies are moving in good volume. One manufacturer reports sizable orders for theatre and store signs. Substantial orders for electrical equipment have been placed since the resumption of activities in the steel mills.

Duquesne Light Co .. General Electric .. Pickands, Mather & Co .. Madison Gas & Elect
Public Service Co. of No. Illinois .. Texas Utilities .. Loup River Public Power Dist
Jersey Central Power & Light .. Westinghouse Elec & Mfg Co .. City of Marquette, Mich
Massachusetts Institute of Technology .. Sun Oil .. New England Tel & Tel .. Idaho Po
Detroit Edison .. E.I.duPont de Nemours .. District of Columbia, D.C. .. Day & Zimmer
Tennessee Valley Authority .. Chicago & Northwestern .. Commonwealth Edison .. Dallas
United Illuminating .. Western Electric Co .. Eastern Shore Public Service Co .. Flor
Ohio-Midland Light & Power .. General Petroleum .. Delaware, Lackawanna & Western R.R
Illinois Bell Tel .. U.S.Navy Dept .. Ware Shoals Mfg. .. Standard Oil Co. of New Jer
New York State Electric & Gas .. Cortland County Traction .. Illinois Northern Utilit
Reading R.R. .. Westchester Lighting Co .. Pennsylvania Power & Light .. Kingsport El
Missouri State Highway Dept .. Public Service Electric & Gas .. Government of Puerto
Scranton Electric Co .. Travelers Insurance .. Charles H. Tenney & Co .. United Elect
Alan Wood Steel .. State of Wisconsin .. Pere Marquette .. Oklahoma Power & Water Co
International Petroleum .. Panama Canal .. Washington, Baltimore & Annapolis Electric
Ohio Edison .. City of Norwich, Conn .. Philadelphia Electric .. Wisconsin Telephone
Virginian Railway .. duPont Rayon .. San Antonio Public Service Co .. Montana Power Co
Panhandle Power & Light .. West Texas Utilities .. Pennsylvania Railroad .. Lynn Gas
Snyder Mining .. Austin Baldwin & Co .. Ohio Power .. U.S.Pipe & Foundry Co .. Empire
New York Telephone Co .. Cleveland Electric Illuminating .. City of Chicopee, Mass ..
Western Colorado Power .. Phillips Petroleum .. Metropolitan Edison .. Pittsburgh Rai
Florida Public Service Corp .. Wisconsin Power & Light .. U.S.Treasury Dept .. Duke P
Louisville & Nashville .. Salt River Valley Water Users Ass'n .. Atlantic Refining Co
Citizens Independent Telephone Co .. Central Hudson Gas & Elec Corp .. San Joaquin Li
Wisconsin Hydro-Electric .. Long Island R.R. .. Potomac Edison .. City of Tacoma, Was
Penn Central Light & Power .. Tonawanda Power Co .. Southwestern Public Service .. Ne
Staten Island Edison .. Baton Rouge Electric .. Clearfield Bituminous Coal .. Kansas
Delaware & Hudson .. City of Detroit, Mich .. Lake Superior District Power Co .. Virg
New Bedford Gas & Electric Light Co .. Texas Pipe Line .. Consolidated Gas Electric L
Kentucky Utilities .. Ohio Public Service .. Richmond, Fredericksburg & Potomac R. R.
Arizona Power .. Southwestern Bell Tel .. duPont Dyeworks .. Delaware Power & Light C
City of Reading, Mass .. Orange & Rockland Electric .. Allied Engineers .. Alabama Po
American Sheet & Tin Plate .. Tidewater Power .. Public Service Co. of Oklahoma .. N.
Ohio Bell Tel .. Baltimore & Ohio .. Tennessee Coal, Iron & R.R.Co .. M. A. Hanna Co
Swedish American Prospecting .. Bangor & Hydro Electric .. Nebraska Power Co .. State
Republic Steel Corp .. Mountain States Power .. Atlas Powder .. Iowa Public Service C
Central West Public Service Co .. State of Illinois Geological Survey .. Connecticut
New York Central .. United Power & Light .. Oliver Iron Mining Co .. Montaup Electric
Southern Bell Tel & Tel .. Atlantic Coast Line .. Minnesota Power & Light .. Erie Cou
Columbia University .. Stone & Webster .. Lansdale, Pa .. Pacific Tel & Te
Turlock Irrigation Dist .. Keystone Pipe Line
Hudson Coal Co .. Dix .. International Agricu
City of Trenton, N.J .. Narragansett
Standard Oil Co. o .. hipbuilding
Hercules Powder .. leveland Uni
Queens Borough Gas .. Glen Alden
Gulf States Utili .. win State Ga

"Megger" ground testing after ten years

Ten years ago "Megger" Ground Testing was introduced . . . and a task that was difficult under any condition, and impractical on a large scale, at once became a simple, inexpensive, routine operation.

Today engineers recommend "Megger" Ground Testing for protection against lightning and other disturbances. Power companies, railroads, communication systems, private industry, all practice it. In ten years the list of users of "Megger" and "Meg" Ground Testers has grown into a "Who's Who" of industry.

Thanks to these instruments the whole subject of grounding and ground testing has been advanced . . . the advantages of adequate grounding are better understood . . . the protection it affords, and its savings, have been proved.

Descriptive Catalog 1425-W, and a 64-page Technical Bulletin on Ground Testing, will be sent on request.

JAMES G. BIDDLE CO.

1211-13 ARCH STREET PHILADELPHIA, PA.

Insulation Testing Instruments

Ground Testing Instruments *Speed Measuring Instruments—Frequency Meters*

That Georgia Power Home-Town Electrical Contest

[*Continued from page 30*]

support the activity in their towns and how they stood to profit from its operation. A special letter, together with a copy of the Customers' Presentation Booklet, was mailed to all dealers, distributors and manufacturers prior to commencement of the contest. Copies of *The Home Town Champion* and other direct mail pieces were mailed regularly to this special group, as were advance proofs of all newspaper advertisements.

At the end of the contest the 24 prize-winning towns were saluted in an hour's broadcast over WSB, the Atlanta *Journal's* 50,000-watt radio station. P. S. Arkwright, president of the Georgia Power Company, described briefly the contest organization, plans and results and presented the official representative of each winning town with its certificate.

Summary of the results

It is difficult, of course, to measure definitely the factors of accomplishment in an activity such as this contest. Generally speaking, however, there are two major factors by which its success may be gauged: First, popular reaction, and, second, actual sales of appliances and service. Both are highly important; the first is more or less intangible, and the second is tangible but subject to the pertinent question: "Well, what might have happened to sales if there had been no contest promotion?" Nevertheless, the following information may give some indication of the results of the contest:

Newspaper editorial comment and the interest that customers, individually and collectively, took in the contest indicated that the popular reaction was highly favorable. In all the contest publicity and advertising the company conceded an intelligent self-interest in increasing the volume of sales of its product, but pointed out that the benefits of increased use of electricity were shared by every one—the individual consumer, the family, the town and the state as a whole, as well as by the company. The frankness and openness of the company's attitude was commented on favorably by many of the newspapers and was a factor in their support of the contest.

A great variety of civic organiza-

tions assumed the contest sponsorship in the various towns. Among them were women's clubs, parent-teacher associations, garden clubs, Lions clubs, city councils, American Legion auxiliaries, Kiwanis clubs, United Daughters of the Confederacy, Daughters of the American Revolution, ladies' aid societies, missionary societies, associated charities, library boards, cemetery associations, drama and music clubs, school faculties and boards of education, service leagues and others.

In naming the projects upon which they would spend any prize money won in the contest, sponsoring groups in 60 towns designated their schools—establishment of home economics departments, purchases of new or additional classroom equipment, lunchroom facilities, gymnasium repairs and other improvements. Thirty-eight towns planned to spend their prizes for the building or furnishing of club houses of one type or another; thirteen towns selected city parks and playgrounds as their prize projects. Another popular project was the city or school library. Other towns proposed highway and cemetery beautification projects.

Different towns went about their promotion of the contest in different ways. Some got the city council to furnish citizens with 100-watt lamps to burn on their front porches at night as auxiliary street lighting; others sent out rubber stamp messages on city water bills and bank statements; several towns conducted essay contests among school children, and the sponsoring organizations in many towns did actual appliance prospect solicitation work.

Load-building results

Dollar volume of appliance sales (exclusive of sales made by dealers) showed an appreciable increase during the twelve months of the contest over the corresponding period of the previous year. During the seven months since the contest sales volume has continued to mount.

Appliance Sales, Dollar Volume

12 months, Nov. 1, 1934, to Nov. 1, 1935	$2,850,602
12 months, Nov. 1, 1935, to Nov. 1, 1936	$3,252,025
7 months, Nov. 1, 1936, to June 1, 1937	$1,697,915

From the standpoint of load building the units of major appliances added to the lines for the two com-

A DEPENDABLE SOURCE OF SUPPLY

BRAIDED COPPER CABLES 400 to 300,000 C.M.

•

STRANDED COPPER CABLES 221 to 500,000 C.M.

Firms which have sent in trial orders to Camden Wire invariably "repeat" and then become regular customers. The reason back of this satisfaction is not found in the size of our plant, the kind of equipment or the desire to please—It's *knowing how* to turn out what the customer orders at a price he admits is fair . . . We make bare wire exclusively—in Braided Cables, Stranded Cables—either bare or tinned, all carefully sized and formed. We will gladly send samples and quote on your requirements.

HOT BATH TINNING, LEADING or CADMIUM

Camden Plated Cables stand up against corrosion far longer than usual because *each strand* is coated in a hot bath of metal before the cable is formed. This process is more expensive but assures complete plating of every wire throughout the length of the cable . . . Write today for complete data and prices.

CAMDEN WIRE CO.

CAMDEN • NEW YORK

The WesCrel offers the smartest light utility yet produced for the home. This fact is admitted by representative lighting engineers. Other obvious, practical adaptations in the entire lighting field are too numerous to classify.

With a WesCrel you not only offer perfect light, direct or indirect, metered at any fixed position, but also with your finger can change the plane of lighting over a range of 180°

WesCrel is the first light which easily adapts itself to the physical characteristics or position of the user.

The first light which eliminates the unsuspected eye strain for the kiddies and old folks of the family.

The WesCrel range of adaptability means two to four sales made to a home dependent solely on the requirements of the family. It is the only absolutely new product in the home lighting field.

At the bridge table one WesCrel will give comfortable diffused lighting on every hand. This market alone assures a major profit to the dealer.

Write for literature, terms and territory.

MICHIGAN BUMPER CORP.
Specialty Division, Dept. W
3105 BARLUM TOWER
Detroit, Michigan

parable periods, as well as those added during the seven months since conclusion of the contest, are of interest.

Unit Sales, Selected Appliances

Appliance	11/1/34-11/1/35	11/1/35-11/1/36	11/1/36-6/1/37
Range	4,725	6,630	3,022
Refrigerator ...	8,905	6,669	4,636
Water heater...	2,894	3,957	2,230
Portable lamp.	18,483	21,484	13,480
Mazda lamp....	485,355	558,496	378,619

Attention is directed to the increases in sales of Mazda and portable lamps, which is an indication of increased appreciation of more and better lighting on the part of all customers, particularly the low-consumption customers. Water heater and range sales are increasing rapidly in the territory and, doubtless, were accelerated during the contest.

Conclusions

One important outcome of the contest promotion from the standpoint of load building was the attention which was drawn to minimum and small-use customers, those using 20 kw.-hr. or less per month and those using 50 kw.-hr. or less. Company employees and citizens interested in the contest became increasingly aware of the small-use customers because of their effect in dragging down the kilowatt-hour average of individual towns and the territory as a whole. Study of the small-customer group pointed to the fact that, althoug' the residential average for the company as a whole was relatively high, a large percentage of customers actually were using less than 50 kw.-hr. per month.

With many lessons gained from the Home-Town Contest and other activities, the company launched its "selective selling program" on January 1 of this year. This program was preceded by a careful market analysis and the inauguration of a special "inducement" rate for customers whose previous use had been 65 kw.-hr. or less per month. Low-priced, high-quality small appliances have been selected for the small-customer market and are being offered on especially liberal terms; well-directed advertising is going to small customers; a special compensation plan makes sales to under-50-kw.-hr.-customers attractive to salespeople, and a new credit philosophy has been built up—a credit policy which views collections *and* load building through the same pair of spectacles.

Functional Aspects of Wiring in Building Design

[*Continued from page 36*]

of the room. This might be termed "surface wiring." There are many methods of surface wiring now in use in which the wiring is wholly concealed or made so unobtrusive as hardly to be seen. And it can be expected confidently that as use and custom give surface wiring larger acceptance it will rapidly be improved and refined.

The provision for supply or permanent wiring might be looked at as the provision of ample and suitable raceways to contain the wiring rather than as the provision of adequate capacity in the wiring itself. These raceways might be any of several various forms, but whatever method is used, the provision of facilities for it should, and could easily, be designed to be as much a permanent element in the structure as are the joists and beams.

"Sohio" Modernizes with Mercury Lighting

[*Continued from page 37*]

of the saving in power cost and not of the business lost. The company's investment, however, is large, and to justify the station's existence a certain volume of business is imperative. With mercury lighting it is possible to have a well-lighted station at an acceptable power cost to the station operator.

The Standard Oil Company has found that this type of lighting not only effects a great saving in dollars and cents but also that its distinctive color is of equal importance. There is a striking contrast between the blue-white brilliance of the mercury light and the reddish-yellow glow of surrounding incandescents. The motorist sees the location quickly and clearly. The picture recorded in his mind is attractive and impressive. His curiosity is aroused, his interest awakened. He stops to investigate and consequently to buy.

•

Use of Electricity High

Alabama Power Company reports that 74 per cent of the towns on its lines have an average use of electricity per residential customer above the national average, 25 towns have a consumption twice the national average and 69 others have a consumption 1½ times the national average.

Recent Rate Changes

THE UNION ELECTRIC COMPANY, of St. Louis, has proposed to the State Public Service Commission that it be authorized to put into effect September 1 a rate reduction that would mean a saving of $1,070,000 a year to 30,000 commercial consumers. This cut, if authorized, will bring to $2,797,500 the total savings by rate reductions put into effect by Union Electric Company in less than four years. Refinancing and a new contract with the Union Electric Company of Illinois is said to make the reduction possible.

NEW YORK PUBLIC SERVICE COMMISSION recently called upon seven more municipally owned electric plants to file reduced rates immediately, bringing the total number of villages so notified to thirty-three. Villages affected by latest order: Bath, Booneville, Churchville, Mayville, Salamanca, Spencerport and Wellsville.

KENTUCKY PUBLIC SERVICE COMMISSION has ordered the Kentucky Utilities Company to reduce its commercial rates in Frankfort; estimated savings to customers are $25,000 a year.

PENNSYLVANIA PUBLIC SERVICE COMMISSION has ordered the Solar Electric Company to cut rates sufficiently to reduce its gross revenue by 10 per cent.

KENTUCKY-TENNESSEE LIGHT & POWER COMPANY has filed a new commercial rate, effective August 1, with the Public Service Commission. Annual savings to consumers are estimated at $45,000.

VIRGINIA PUBLIC SERVICE COMPANY has announced rate reductions, effective August 1, which are estimated to save its customers $250,000 a year. About $109,000 of the estimated savings will be in residential service and some $55,000 in commercial service. New rates cover all territory served by the company except Arlington county and Alexandria, where reductions were instituted April 1. Lower rates for retail power and combined small power and light became effective July 1 throughout the company's territory. These, and other adjustments on June 1, effected savings of approximately $88,000 a year for consumers.

GEORGIA PUBLIC SERVICE COMMISSION has ordered reduction of residential electric rates in 37 South Georgia cities and towns served by the Georgia Power & Light Company, with estimated savings to customers of $18,000 a year. The new rates: first 25 kw.-hr., 6.5 cents per kw.-hr., instead of 7.5; next 35, 5 cents (unchanged); next 140, 3 cents (unchanged); all over 200, 1.5 cents, instead of 2. Negotiations toward possible reductions in commercial rates were continued until October 15.

TENNESSEE PUBLIC UTILITIES COMMISSION has announced rate reduction, effective October 1, for the Kingsport Utilities, Inc. Savings to customers are estimated at $60,000 a year.

JACKSON (GA.) CITY COUNCIL has granted reduction in light and power rates to affect all customers, with estimated savings at around $1,400 yearly, effective with July readings.

MASSACHUSETTS DEPARTMENT OF PUBLIC UTILITIES has a petition from customers of the Wachusett Electric Light Company requesting a reduction in electric rates for the town of Clinton. Petition contains 2,450 names, said to be one of largest to be filed at the department.

INSULATING TUBING

DILECTO *phenol fibre*
DIAMOND VULCANIZED FIBRE
CELLULAC, VULCOID
MICABOND *a bonded Mica*

Insulating Tubing has been a special study of the Continental-Diamond Fibre Company. If you have an insulating problem involving the use of tubing we can help you regardless of the type you are now using.

Our equipment for manufacturing tubing of various sizes is most complete. We also have unexcelled facilities for fabricating tubing to your specifications.

Since we manufacture practically every type of laminated insulating tubing—including Mica—our recommendations will be unbiased and you will benefit from our knowledge of thousands of applications of insulating tubing in all industries.

We shall be glad to have an opportunity to study your particular problem involving the use of Insulating Tubing and submit marked samples and quotations whether your requirements be standard lengths, cut pieces or fabricated forms.

CONTINENTAL-DIAMOND FIBRE COMPANY
NEWARK, DELAWARE
Represented in Canada by Diamond State Fibre Co. of Canada, Ltd., Toronto

ROME-CABLE
ROME, N.Y.

In one compact unit in Rome, N. Y., are the rolling, drawing and insulating mills and the executive offices of

ROME CABLE

Every department has as its head a carefully chosen superintendent experienced in his line.

In such surroundings every order from every customer finds capable hands to speed its progress.

We will be pleased to quote on your requirements for

HOT ROLLED COPPER RODS
BARE & TINNED COPPER WIRE
(In rounds, flats & squares)
BARE & TINNED STRAND
U.R.C. WEATHER PROOF WIRE
MAGNET WIRE
FLEXIBLE CORDS
RUBBER COVERED WIRES & CABLES
LEAD COVERED CABLES

ROME CABLE CORPORATION

Mills and executive offices
330-400 Ridge Street
ROME, N. Y.

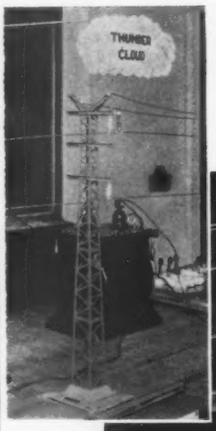
SALES OFFICES:
New York Chicago
Cleveland Pittsburgh Boston
Philadelphia

Lightning Safeguards Proven by Models

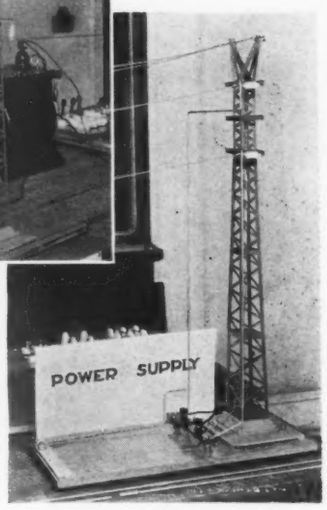
[*Continued from page 27*]

quickly reclosed after the arc has been extinguished by opening the power switch. If an arc is blown out quickly the power supply need not be interrupted. Deion or protective expulsion gaps mounted at each conductor on every tower are the practical application of this principle. The Nicholson arc extinguisher, now obsolete, reduced line voltage momentarily to extinguish an arc by connecting a fuse across the high-voltage line.

4. The best form of lightning protection is that which prevents flashovers entirely.



Arcing carbons provided on middle tower



Strain tower at power supply end

Overhead ground wires, properly placed, prevent strokes terminating on line conductors. With the thundercloud over the span having overhead ground wires and with the counterpoise conductors removed, it is demonstrated that a stroke to the tower, or to an overhead ground wire connected to it, does not prevent flashover if the tower grounding is poor. Under such conditions a line conductor is not struck, but the potential of the whole tower structure rises considerably and a "back-flash from the tower to a line conductor occurs.

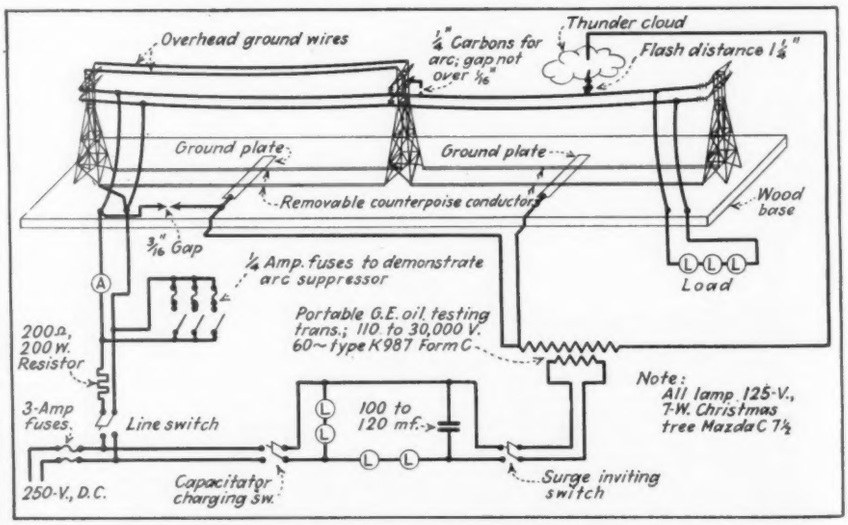
5. With the counterpoise conductors placed in position any lightning strokes to the line pass harmlessly to earth. There is no flashover or arcing due to the ability of a counterpoise conductor to carry away the lightning charge. In practice, the counterpoise conductors are buried about 2 ft. under ground.

6. By returning the thundercloud to its original position it can be demonstrated that low footing resistance is not in itself sufficient to prevent flashovers. If a stroke terminates on a line conductor flashover will always occur. Hence, overhead ground wires are essential for shielding line conductors against direct strokes.

●

Plans Project in Indiana

Application has been filed with the Federal Power Commission by the Acme Engineering Service, Inc., Fort Wayne, Ind., for a preliminary permit covering the construction of three dams and two power plants on the Salamonie River in Wabash and Huntington Counties, Ind. The tentative installed capacity of the two power plants is 2,000 hp. The applicant proposes to sell the power to be developed in the open market or at wholesale to existing utility companies.


Overhead ground wires
¼" Carbons for arc; gap not over ⅛"
Thunder cloud
Flash distance 1¼"
Ground plate
Ground plate
Removable counterpoise conductor
Wood base
3/16" Gap
¼ Amp. fuses to demonstrate arc suppressor
Load
200Ω, 200 W. Resistor
Portable G.E. oil testing trans.; 110 to 30,000 V. 60~ type K987 Form C
Note: All lamp 125-V., 7-W. Christmas tree Mazda C 7½
3-Amp fuses.
Line switch
100 to 120 mf.
250-V., D.C.
Capacitator charging sw.
Surge inviting switch

Toy towers constitute supports

Towers are models 24 in. high, made by the Lionel Corporation, with supports for overhead ground wire added. Three crossarms and six miniature insulator strings are provided with each tower, but for simplification of the demonstration conductors are suspended only from the top and bottom crossarms on the towers. The two lower crossarms on the center tower were lowered to provide sufficient clearance for the top conductor. The arms on the two end towers did not have to be relocated.

Product Improved by Electric Heat Treating

[*Continued from page 35*]

eration is no greater than with the former fuel method. An important advantage of the carburizing furnace is that after being shut down for fourteen hours it can be brought up to full heat in half an hour, and during this period there is no unevenness of temperature. The entire furnace heats evenly and maintains this even heat distribution during the entire time material is receiving treatment. Perfect heat balance means, of course, uniform results, with each piece an exact duplicate of all others.

Decarburization is prevented in modern hardening processes by the use of the controlled atmosphere electric furnaces. With these, steel leaves the furnace heated to an exact degree and containing the same per cent of carbon as before heating. Such a furnace is used by the Jacobs company in its new electric heat-treating department. It is of the conveyor type with atmospheric control and with a conveyor belt to carry work out of the oil quench tank. Chuck parts leaving the quench tank require no cleaning, which was formerly done by hand with wire brushes and by "tumbling" in a sand box. Pickling and washing have also been eliminated, resulting in fewer rejects and producing considerable savings.

Tempering was another phase of heat treating which was troublesome because tempered parts were treated in a fuel-fired rotary furnace which maintained very poor temperature control. Defective parts with this system were numerous, making this a costly process in chuck manufacture. Using the new electric drawing furnace, which gives a temperature variation of less than 5 deg., has given improved tempering and at the same time resulted in savings.

Jaw strength doubled

Before the installation of electric furnaces heat-treating processes were performed by fuel-fired furnaces. This meant a great many more steps, and also meant that certain desirable alloys of steel could not be used due to scaling and decarburization occurring during heating. The strength of the jaws is now twice that obtainable with the former methods and still they retain the same surface hardness. The strength of the threads in the nut

Insulators are bought on *performance*

choose *Service Connectors* too, on quality standards!

In connectors, as in insulators, performance characteristics count heavily toward influencing the choice of critical buyers.

The ability to withstand excessive wrench pressure without distortion or weakening or nicking the conductors is a valuable performance characteristic of the Burndy Servit. Forged by a patented process from a high copper content alloy, the Servit possesses the toughness and corrosion-resistance that make possible years of trouble-free performance.

Right: The Burndy Servit, Type KS—the service connector with "forged-in" strength. Made in a wide range of sizes for copper, aluminum and galvanized steel wire.

BURNDY
ENGINEERING CO., INC.
459 E. 133d STREET (B) NEW YORK, N. Y.

Reliable

STRAIGHTLINE DEAD ENDS

★ For use with disk insulators. Also used with eyebolts terminating neutrals on rural lines.

The Reliable Straightline Dead End has a wire holding mechanism, identical with that in the Reliable Straightline Splice, fastened to a small but husky reinforced clevis.

Makes a neat, convenient, and economical installation.

Its low price will interest you. Write for bulletin.

Reliable ELECTRIC COMPANY
OVER 25 YEARS SERVICE TO THE UTILITIES
3145 CARROLL AVENUE - CHICAGO, ILLINOIS

have been increased by 50 per cent through the use of an alloy steel which was formerly impossible to employ.

With the new heat-treatment methods the accuracy of the chucks has been increased through two main causes: Distortion has been reduced to a minimum, and polishing which caused unevennessess, has, because of scale-free work, become unnecessary.

With these important improvements in its product the Jacobs company also reports that working conditions are much improved in the heat-treatment department. Smoke and fumes have been eliminated to a large degree, making the conditions such that female labor is now employed on inspection work in the department.

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Poles Treated Show Gain of 51 per Cent

In 1936 3,119,248 poles were treated, an increase of 1,085,548 or 51 per cent, over the number reported in 1935, according to a report by R. K. Helphenstine of the U.S. Forest Service. Over 67 per cent of all poles treated were Southern pine, all of which received full-length pressure treatment.

Of the total number of poles subjected to treatment during the year covered by this report 2,145,066, or nearly 69 per cent, received pressure treatment and 974,182 non-pressure (open-tank) treatment. Of the poles treated 98.3 per cent were treated with creosote.

The accompanying table shows by kinds of wood and kinds of treatment the number of poles that were reported in 1936.

Poles Treated by Kinds of Wood and Kind of Treatment—1936

Kind of Wood	Pressure Treatment	Non-Pressure Treatment	Total
Southern pine	2,102,246	.....	2,102,246
Cedar—			
Western red	12,193	654,663	666,856
Northern white	.....	199,473	199,473
Southern red	.....	5,823	5,823
Lodgepole pine	1,310	85,485	86,795
Chestnut	.....	26,433	26,433
Douglas fir	22,703	960	23,663
Oak	6,059	.....	6,059
Redwood	59	215	274
Miscellaneous	496	1,130	1,626
Total	2,145,066	974,182	3,119,248

Sales Opportunities

ST. AUGUSTINE, FLA.—Florida Power & Light Company, Miami, Fla., plans extensions in 31,000-volt transmission line in vicinity of St. Augustine, totaling close to 13 miles.

CAMBRIDGE, MASS.—Boston Blacking & Chemical Company, Kendall Square, plans installation of motors and controls, conveyors, regulators and other equipment in new additions to plant, for which bids will be asked soon on general contract. Cost about $350,000. Coolidge, Shepley, Bulfinch & Abbott, 1 Court Street, Boston, are architects; Hollis French, 210 South Street, is engineer. Company is a subsidiary of United Shoe Machinery Corporation, Boston.

PRESTON, MINN.—Fillmore County Co-operative Electric Association, Preston, Lawrence Tllafson, secretary-treasurer, is arranging immediate call for bids for primary and secondary lines for rural electrification in parts of Fillmore County, approximating 175 miles, with outdoor power substations and service facilities. Fund of $167,000 has been secured through federal aid. Toltz, King & Day, Inc., Pioneer Building, St. Paul, Minn., is consulting engineer.

MOUNT PLEASANT, TENN.—Victor Chemical Works, 141 West Jackson Boulevard, Chicago, Ill., plans installation of a large electric furnace plant for production of phosphorus on tract of about 130 acres of land recently acquired near Mount Pleasant. Several such units will be built, with other equipment installation to include motors and controls, conveyors, electric hoists, etc. Electric power supply will be secured from lines of TVA in vicinity of plant site, where power substation will be built. Entire project will cost close to $1,000,000. August Kochs is president.

BAYFIELD, WIS.—Lake Superior District Power Company, Ashland, Wis., plans early construction of 33,000-volt transmission line from connection with present system to Bayfield, where new power substation will be built for power supply to Northern Wisconsin Power Company. Cost about $40,000. Permission has been secured.

MORGAN CITY, LA.—St. Mary-Iberia Electric Co-operative Association, Franklin, La., care of W. P. Foster, president, has plans maturing and will take bids soon for primary and secondary lines for rural electrification in parts of St. Mary and Iberia Parishes, totaling about 100 miles, with outdoor power substations and service facilities. Fund of $95,000 is being secured through federal aid.

KANKAKEE, ILL.—General Foods Corporation, 250 Park Avenue, New York, N. Y., plans installation of motors and controls, conveyors, transformers and accessories, and other equipment in new corn milling plant at Kankakee. Cost over $400,000.

WAVERLY, IOWA.—Has plans maturing for new addition to municipal electric power plant, with installation of new Diesel engine-generator units and accessory equipment. Cost about $185,000. Young & Stanley, Inc., Muscatine, Iowa, is consulting engineer.

EVANSVILLE, IND.—Southern Indiana Gas & Electric Company has approved plans for extensions and improvements in local steam-electric power plant, including installation of new equipment. Cost about $300,000.

CHICAGO, ILL.—Sherwin-Williams Company, 647 East 115th Street, plans installation of motors and controls, conveyors and other equipment in new four-story addition

to local paint and varnish plant. Cost about $100,000. A building permit has been issued. Main offices of company are at 101 Prospect Avenue, N. W., Cleveland, Ohio.

NEWTON, IOWA.—Iowa Power & Light Company, Des Moines, Iowa, plans extensions in transmission and distributing lines in parts of Sherman, Clear Creek and neighboring counties, totaling close to 30 miles. Permission has been secured.

MOBILE, ALA.—Aluminum Ore Company, 3300 Missouri Street, St. Louis, Mo., an interest of Aluminum Company of America, Gulf Building, Pittsburgh, Pa., plans installation of motors and controls, furnace units, conveyors, regulators, transformers and accessories, electric hoists and other equipment in new multi-unit bauxite ore mill on tract of waterfront property at Mobile, recently secured under long-term lease. Cost close to $3,500,000. C. B. Fox is president.

CRESTVIEW, FLA.—Gulf Power Company, Pensacola, Fla., plans new 11,000-volt transmission line in section of Okaloosa County, to connect with power substation furnishing service at Crestview and vicinity, where capacity will be increased. Application has been made for permission.

WEEPING WATER, NEB.—Nebraska Power Company, Omaha, Neb., plans extensions in transmission lines in vicinity of Weeping Water. Application has been made for permission.

BOGALUSA, LA.—Bogalusa Paper Company, Inc., affiliated with Gaylord Container Corporation, St. Louis, Mo., plans installation of motors and controls, conveyors, electric-operated pumping machinery and other equipment in new addition to mill, for which work will begin soon. Cost about $350,000.

ROCKPORT, MO.—Has plans maturing for new municipal electric power plant and will begin work on project at early date. A bond issue of $90,000 has been authorized. Engineering Service Company, Railway Exchange Building, Kansas City, Mo., is consulting engineer.

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Municipal Plants

CASTLEBERRY, ALA.—H. R. Deuel, owner of the city's electric system, has petitioned the Alabama Public Service Commission for authority to sell his plant and lines to the Alabama Power Company. Hearing has been set for August 2.

OWENSBORO, KY.—Co-operating with the Green River Rural Electric Association, the city will erect a substation and sell current to the association at 1.25 cents a kilowatt-hour.

HAMILTON, OHIO — City Council has awarded contracts totaling about $70,000 for completion of the addition to the municipal electric light plant.

DECATUR, ALA.—City will advertise for bids for erection of an electric distribution system following a unanimous vote by members of the Council. Alabama Power Company refused earlier offer of Mayor R. N. Harris to buy existing system.

PORTLAND, ORE.—Negotiations have been under way between city and Northwestern Electric Company for extension of city's option to buy company's properties, which expires with expiration of company's franchise November 13 this year. No substantial public demand for municipal ownership was claimed at hearing before Council on July 15, which will again consider the question on August 19.

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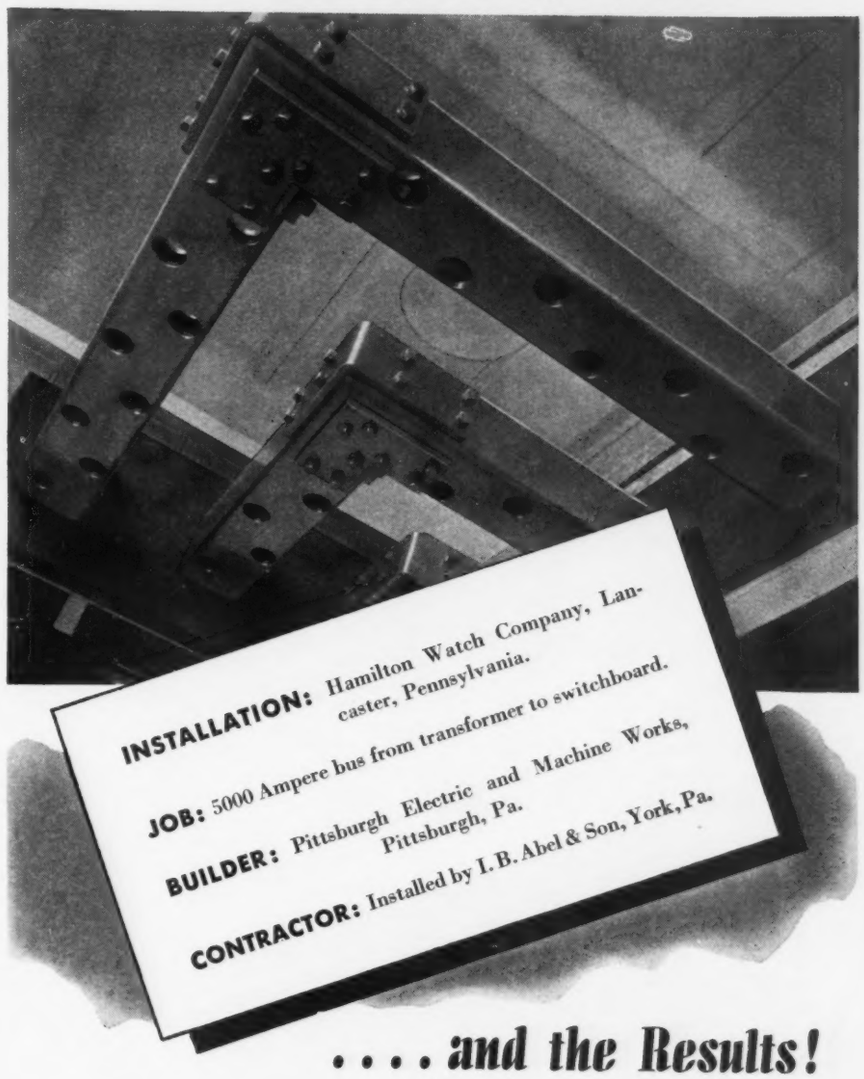

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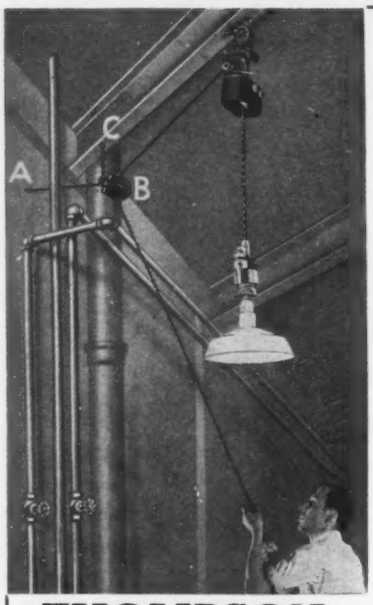

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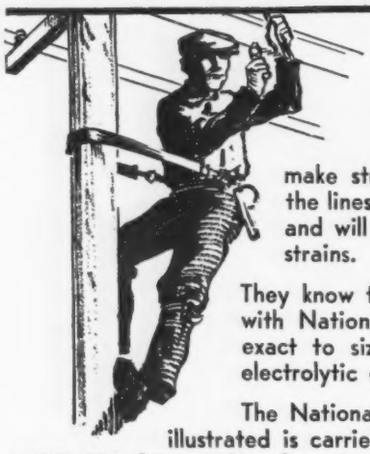

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Scully Steel Products Co., Chicago, Ill.

AIR-CONDITIONING EQUIPMENT
General Electric Co., Schenectady, N. Y.
Kelvinator Corp., Detroit, Mich.
Westinghouse E. & M. Co., E. Pittsburgh, Pa.
Worthington Pump & Mchy. Corp., Harrison, N. J.

AMMETER, CLIP-ON
Columbia Elec. Mfg. Co., Cleveland, Ohio
Ferranti Electric, Inc., New York, N. Y.

ANALYSES, REVENUE
Recording & Statistical Corp., New York.

ANCHORS, GUY
Chance Company, Centralia, Mo.
Everstick Anchor Co., Fairfield, Iowa
Hubbard & Co., Pittsburgh, Pa.
Kearney Corp., James R., St. Louis Mo.

ANNUNCIATORS
Bendix Marine Products, Inc., Brooklyn, N. Y.

APPLIANCES, HEATING
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., New York, N. Y.

BATTERIES, STORAGE, ALL APPLICATIONS
Electric Storage Battery Co., Phila., Pa.
Gould Storage Battery Corp., Depew, N. Y.

BLOCKS, LINEMEN'S CABLE STRINGING
Western Block Co., Lockport, N. Y.

BOILERS, STEAM
Babcock & Wilcox Co., New York, N. Y.
Combustion Engineering Co., New York, N. Y.

BRACKETS & WIREHOLDERS, INSULATED
Hubbard & Co., Pittsburgh, Pa.
Line Material Co., South Milwaukee, Wis.
Porcelain Products, Inc., Parkersburg, W. Va.
Utilities Service Co., Allentown, Pa.

BRASS AND BRONZE
Bridgeport Brass Co., Bridgeport, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Scully Steel Products Co., Chicago, Ill.

BRUSHES, CARBON
National Carbon Co., Inc., Cleveland, Ohio
Ohio Carbon Co., Cleveland, Ohio
Speer Carbon Co., St. Mary's, Pa.

BURNERS, OIL, GAS, PULVERIZED FUEL
Babcock & Wilcox Co., New York, N. Y.
Combustion Engineering Co., New York, N.Y.

BUS BAR SUPPORTS
Burndy Engineering Co., New York, N. Y.
Delta-Star Electric Co., Chicago, Ill.
Electrical Engrs. Eqpt. Co., Melrose Park, Ill.
General Electric Co., Schenectady, N. Y.
MEMCO Engrg. & Mfg. Co., Long Island City
Railway & Ind. Engrg. Co., Greensburg, Pa.
Schweitzer & Conrad Inc., Chicago, Ill.

BUS BARS & TUBES
American Brass Co., Waterbury, Conn.
Chase Brass & Copper Co., Waterbury, Conn.

BUSHINGS, APPARATUS
Illinois Electric Porcelain Co., Macomb, Ill.
Imperial Porcelain Works, Trenton, N. J.
Lapp Insulator Co., Le Roy, N. Y.
Locke Insulator Corp., Baltimore, Md.
Ohio Brass Co., Mansfield, Ohio
Porcelain Products, Inc., Parkersburg, W. Va.
Thomas & Sons Co., R. W., Lisbon, Ohio
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

CABLE, ALUMINUM
Aluminum Co. of America, Pittsburgh, Pa.
General Cable Corp., New York, N. Y.

CABLE, NETWORK
Anaconda Wire & Cable Co., New York, N. Y.
American Steel & Wire Co., Chicago, Ill.
Crescent Ins. Wire & Cable Co., Trenton, N. J.
General Cable Corp., New York, N. Y.
Hazard Ins. Wire Works, Wilkes-Barre, Pa.
Okonite Co., Passaic, N. J.
Rockbestos Products Corp., New Haven, Conn.

CABLE, PAPER INSULATED
American Steel & Wire Co., Chicago, Ill.
Anaconda Wire & Cable Co., New York, N. Y.
General Cable Corp., New York, N. Y.
General Electric Co., Schenectady, N. Y.
Kennecott Wire & Cable Co., Phillipsdale, R. I.
Okonite-Callender Cable Co., Passaic, N. J.
Phelps Dodge Copper Products Corp., N. Y.
Roebling's Sons Co., J. A., Trenton, N. J.
Simplex Wire & Cable Co., Boston, Mass.

CABLE, PARKWAY
American Steel & Wire Co., Chicago, Ill.
Anaconda Wire & Cable Co., New York, N. Y.
Crescent Ins. Wire & Cable Co., Trenton, N. J.
General Cable Corp., New York, N. Y.
Kerite Ins. Wire & Cable Co., New York, N. Y.
Okonite Co., Passaic, N. J.
Roebling's Sons Co., J. A., Trenton, N. J.
Simplex Wire & Cable Co., Boston, Mass.

CABLE, SERVICE ENTRANCE
Anaconda Wire & Cable Co., New York, N. Y.
Crescent Ins. Wire & Cable Co., Trenton, N.J.
General Cable Corp., New York, N. Y.
Hazard Ins. Wire Works, Wilkes-Barre, Pa.
Okonite Co., Passaic, N. J.
Phelps Dodge Copper Products Corp., N. Y.
Simplex Wire & Cable Co., Boston, Mass.

CABLE, STEEL STRAND
American Steel & Wire Co., Chicago, Ill.
Indiana Steel & Wire Co., Muncie, Ind.
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